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### STUDIES IN TUBERCULOSIS.

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#### II. THE RELATIVE INCIDENCE OF HUMAN AND BOVINE TYPES OF MYCOBACTERIUM TUBERCULOSIS IN HUMAN DISEASE IN VICTORIA.<sup>1</sup>

In January, 1938, after consultation with the Tuberculosis Committee of the National Health and Medical Research Council, and with monetary assistance from the council, I undertook a survey of the position in Australia regarding the activities of the bovine type of *Mycobacterium tuberculosis* in tuberculous disease of human subjects. In order that the net for the collection of material might be thrown as widely as possible, Dr. M. J. Holmes kindly interested himself in arranging that appropriate specimens received at the Commonwealth Health Laboratories should be transmitted to me at the Children's Hospital, Melbourne; in this way specimens have been received from Hobart (41), Launceston (7), Bendigo (8), Lismore (4), Toowoomba (3), Canberra (1) and Darwin (1). The addition of four specimens from the Royal Alexandra Hospital for Children, Sydney, and three from the Royal North Shore Hospital, Sydney, brings the total of specimens other than Victorian to 72, in an aggregate of 928.

The 72 extra-Victorian specimens yielded 51 cultures of *Mycobacterium tuberculosis* from as many different persons, while the 319 cultures obtained from Victorian sources were derived from 255 individuals. Although it was hoped to secure sufficient material from other States to give the investigation an interstate character, in view of the fact

that the number of patients furnishing cultures of *Mycobacterium tuberculosis* in all other States combined (51) eventuated as one-fifth of the number from Victoria (255), the study resolved itself into a reexamination of the position in Victoria as it was determined by Penfold (1924)<sup>(1)</sup> and myself (1932).<sup>(2)</sup>

At the outset it was considered that the cultivation of *Mycobacterium tuberculosis* from large numbers of specimens of tuberculous sputum would not be a profitable undertaking. The almost invariable recovery of the human type of bacillus was regarded as a foregone conclusion, and in the organization of the collection of specimens material from non-respiratory tuberculosis was requested, to the exclusion of tuberculous sputum. As recorded by M. J. Holmes,<sup>(3)</sup> Penfold and officers of the Commonwealth Health Laboratories had determined the type of 141 cultures of *Mycobacterium tuberculosis* recovered from tuberculous sputum as human in every instance, and the decision to exclude sputum from the projected investigation was taken on the ground that time and energy directed towards the detection of bovine strains could be better expended in other directions.

Considerable interest attaches to the subject of human pulmonary tuberculosis of bovine origin, discussed in the literature under the ambiguous name of "bovine phthisis". A. Stanley Griffith<sup>(4)</sup> states that at the beginning of 1922 only four cases in human beings of phthisis due to the bovine type of *Mycobacterium tuberculosis* had been recognized in Great Britain and none abroad. Subsequent work by Munro in the rural districts of Fifeshire and Cumming in the north of England has shown that the incidence of "bovine phthisis" is by no means negligible; the number of instances recorded and substantiated in Great Britain up to 1937 was 163. In Denmark, Jensen<sup>(5)</sup> has identified bovine tubercle bacilli in the sputum or gastric content of 88 of 1,774 human subjects of pulmonary tuberculosis (4.9%). Observations in the Netherlands by A. Charlotte

<sup>1</sup>A report to the National Health and Medical Research Council of Australia.

Rays<sup>10</sup> disclosed 13 bovine strains among 204 cultures of *Mycobacterium tuberculosis* recovered from human sputum (6.4%). Bruno Lange (1932)<sup>11</sup> reported having cultivated *Mycobacterium tuberculosis* from the sputum of 40 subjects of pulmonary tuberculosis in Germany whose occupation brought them into close contact with cattle. No less than eight of the strains in this group were of bovine type, the remaining 32 being human. Such findings in other countries suggest that as an agent in pulmonary tuberculosis of human beings in Australia the bovine type of *Mycobacterium tuberculosis* should not be summarily excluded.

#### Differentiation of Human and Bovine Types of *Mycobacterium tuberculosis*.

From 306 individual patients, 123 of whom were children aged under fourteen years, and 183 were adults, 370 cultures of *Mycobacterium tuberculosis* have been recovered and identified with respect to human or bovine type. As has been indicated in the first of this group of papers, in all except six instances, in which the tissues of an inoculated guinea-pig were utilized, *Mycobacterium tuberculosis* was cultivated directly from the material submitted. In the same communication were detailed the technique of cultivation and the media employed.

The criteria observed in the differentiation of human and bovine strains were those of the British Royal Commission (1911), modified by the omission of the rabbit virulence test in certain rigidly defined circumstances. Little or no attention was paid to the morphology of the acid-fast bacilli; but a strong lead as to the human or bovine type of the organism was generally given by the cultural characters. The striking contrast between the luxuriant, verrucose, pigmented and relatively rapid growth of the human or "eugonic" strain, with characteristics developed to a maximum on media containing glycerin, and the scanty, flat, non-pigmented, slowly growing bovine or "dysgonic" strain, its growth retarded or perhaps inhibited by the presence of glycerin, enabled a provisional identification with respect to type to be made in the vast majority of instances.

At the conclusion of a former study of this subject in 1932 I was convinced that for the classification of many eugonic, glycerophilic, pigmented strains as "human", particularly when post-mortem evidence indicated a respiratory path of infection, and a history of exposure of the child to tuberculous infection from a phthisical relative was recorded, the virulence test in the rabbit was an unnecessary refinement. I have never known the behaviour of the strain in the rabbit to reverse a decision of "human" for a culture of *Mycobacterium tuberculosis* recovered in the foregoing circumstances and with the cultural characters indicated. It is now thirty years since the British Royal Commission formulated the standards for the differentiation of human and bovine strains of tubercle bacilli, and it would appear that in respect of many human strains such standards might now be revised and relaxed.

A. Stanley Griffith,<sup>12</sup> in reporting on types of tubercle bacilli as he had identified them in a series of 145 cases of bone and joint tuberculosis, presented the results as determined by cultural characters. If a strain proved eugonic, the virulence test on the rabbit was as a rule omitted. All dysgonic cultures, on the other hand, were tested on rabbits. In his well-known monograph on tuberculosis in children, Blacklock<sup>13</sup> recorded the distribution of human and bovine types in 241 cultures of *Mycobacterium tuberculosis* which he investigated from this aspect. Of 152 human strains, 94 were confirmed as such by the inoculation of rabbits. The remaining 58 were typical eugonic pigmented growths, and in view of their very distinctive cultural features Blacklock did not proceed to type such strains by animal experiment. All had been recovered from thoracic lesions which caused death. In a study undertaken to ascertain the extent of tuberculosis of bovine origin in north Holland, A. Charlotte Ruys<sup>14</sup> chose direct cultivation from morbid material as preferable to guinea-pig inoculation and cultivation from the tissues of the animal; she confirmed the identity of all bovine strains by inoculation of rabbits, but accepted some of

the human strains as such on their well-declared cultural characters.

Park and Krumweide,<sup>15</sup> in their exhaustive study of type differentiation of tubercle bacilli, directed much attention to technique and concluded that all cultures attaining maximum luxuriance on glycerin egg medium in primary culture or the first transfer were "surely of the human type". They were of the opinion that the acceptance of such eugonic strains as human, provided sparse growths and those of intermediate characters were efficiently examined by rabbit inoculation, would not introduce, in the results of an examination of a series of specimens for statistical purposes, an error of more than a very small fraction of 1%.

The standards observed for the differentiation of human and bovine types in the present investigation may be thus stated:

1. Strains which displayed a vigorous and eventually luxuriant and pigmented growth in primary culture or first subculture, and in the presence of glycerin, were accepted as of the "human" type of *Mycobacterium tuberculosis*.

2. All strains which fell short in any of these cultural characters, or were in any way hesitant in growth, flat, or deficient in pigment, were not finally classified until their virulence in the rabbit had been determined.

3. No strain was recorded as of bovine type unless it exhibited the required degree of virulence in the rabbit.

Among the 370 cultures of *Mycobacterium tuberculosis* recovered and studied there were 12 "dysgonic human" strains, equivocal as regards cultural characters, but of low virulence to the rabbit. Thirteen other dysgonic cultures were indubitably bovine in type, as was established by their pathogenicity for the rabbit.

The technique employed to determine virulence in the rabbit was to prepare an emulsion of the strain under investigation of about the same density as that of a staphylococcus emulsion containing 250,000,000 organisms per cubic centimetre. The rabbit was anaesthetized with ether, one cubic centimetre of the tubercle bacillary emulsion was taken into a syringe of five cubic centimetre capacity, and with the syringe thus charged blood was aspirated from the heart of the rabbit. As soon as the blood rushed into the barrel of the syringe it was returned to the heart, with the emulsion of tubercle bacilli with which it had mixed. By means of this technique of intracardiac injection, adopted on account of the extreme difficulty of making injections into the ear veins of Australian wild rabbits, I experienced no fatalities from air embolus or hæmopericardium.

With the virulence test carried out in the manner indicated, bovine strains determined death from disseminated tuberculosis in the Australian wild rabbit after an average time interval of 15.5 days. This figure is calculated from notes relating to 34 rabbits inoculated with dysgonic strains of *Mycobacterium tuberculosis* of sufficiently exalted virulence to warrant their classification as bovine.

Rabbits inoculated by the same technique of intracardiac injection with strains culturally human live for an indefinite number of weeks or even several months. It is my practice to kill the animal after the lapse of six weeks, and it is usual to find by autopsy small tubercles scattered through the lungs and kidneys. There is frequently a local tuberculous granuloma in the pericardium at the site of intracardiac injection; but the severity of the lesions, after six weeks, is not comparable with the heavy dissemination induced by bovine strains in fifteen days.

#### Presentation of Results.

From 928 specimens examined, many of which were derived from clinical conditions which proved to be non-tuberculous or have remained unelucidated, 370 cultures of *Mycobacterium tuberculosis* have been obtained; these represent 306 patients. In the case of many of the children whose presenting clinical features were those of tuberculous meningitis, tubercle bacilli were cultivated from the cerebro-spinal fluid withdrawn by diagnostic

lumbar puncture, and subsequently from other morbid material secured *post mortem*. For some of the subjects of genito-urinary tuberculosis cultural examination of the urine was repeated as a check upon progress. In this manner the number of cultures obtained was 64 in excess of the number of patients. Table I summarizes the sources of the cultures and their distribution among tuberculous lesions in children and adults, and indicates their human (H) or bovine (B) character.

TABLE I.  
Number, Sources and Types of Cultures of *Mycobacterium tuberculosis*.

Source of Culture.	Children.	Adults.
Urine .. .. .	17 H	117 H
Cerebro-spinal fluid .. .. .	57 H	8 H
Bones and joints .. .. .	20 H	45 H
Cervical glands .. .. .	10 B	1 H
Mesenteric glands .. .. .	1 H	—
Bronchial glands .. .. .	1 B	1 H
Pleural effusions .. .. .	—	14 H
Epididymis .. .. .	—	2 H
Gastric content .. .. .	16 H	—
Glands in relation to tuberculous joints .. .. .	6 H	2 H
Glands in relation to cutaneous tuberculosis .. .. .	3 H	—
Sputum .. .. .	2 H	6 H
Miscellaneous .. .. .	—	4 H
Number of cultures .. .. .	170	200
Number of patients .. .. .	123	183

The series provided an undoubted example of double infection, to be made the subject of detailed discussion in a later section.

There was not a single instance of a bovine strain among 200 cultures of *Mycobacterium tuberculosis* derived from 183 adult patients; with the exception of 14 from pleural exudates and six from sputum, all the cultures were obtained from extrapulmonary sources. Of 170 cultures recovered from 123 children, of a maximum age of fourteen years, 12 only exhibited the cultural characters and degree of virulence for the rabbit requisite for their classification as bovine. One of the 12 bovine strains was a duplicate, having been recovered from a bronchial gland of a child who yielded a culture of *Mycobacterium tuberculosis* of bovine type from a mesenteric gland also.

The incidence of bovine infection in childhood, as determined during the three years from 1938 to 1940 inclusive, is therefore 11:123 or 8.9%, a striking reduction on the figure of 25.9% which emerged from my investigation into the same question during the three-year period from 1929 to 1931 inclusive.

In Table II are placed in juxtaposition the findings with respect to children aged fourteen years and under in the 1929-1931 and 1938-1940 studies respectively. In the more recent work the morbid material examined covered a

much wider range; but for comparative purposes only those sources of material which correspond with those of the former investigation are detailed.

It will be observed that with the exception of one bovine strain obtained from a bronchial gland—and this culture duplicated that from a mesenteric gland in the same child—the bovine bacillus did not occur outside the group of tissues comprised by the tonsils and the cervical and mesenteric glands. This finding, perhaps the most important of the 1929-1931 observations, is recorded again for the series just concluded. Bovine strains comprised 67.7% of 31 cultures of *Mycobacterium tuberculosis* recovered from cervical glands and tonsils during the three years ending December, 1931; tubercle bacilli cultivated from the cervical glands of 23 children over the three-year period from 1938 to 1940 included 10 (43.5%) of the bovine type.

#### Tuberculous Cervical Adenitis.

A high incidence of bovine infection in tuberculous cervical adenitis has been found by all workers who have studied the question. A. Stanley Griffith,<sup>(11)</sup> summarizing in 1929 English and Scottish statistics, recorded that of 133 patients from whom tubercle bacilli had been recovered from the cervical glands, 68 yielded the human and 65 the bovine type of bacillus—a "bovine rate" of 48.8%. Only 17 of the 133 cultures were of Scottish origin, the remainder having been obtained in England; but in the small Scottish group the percentage of bovine infections was 70.6.

Mitchell<sup>(12)</sup> (1914) examined morbid material derived from 72 children affected with tuberculous cervical adenitis in the city and neighbourhood of Edinburgh and determined the incidence of bovine infection as 90.3% (65/72). Eighteen years later Blacklock<sup>(13)</sup> reported successful cultivation and differentiation of type of *Mycobacterium tuberculosis* in 28 instances of tuberculous glands of the neck in Scottish children. No less than 18 of the 28 (64.3%) were of bovine type. R. M. Price<sup>(14)</sup> (Toronto, 1932) studied cultures of *Mycobacterium tuberculosis* recovered from 37 children, none aged over fifteen years, and all subjects of tuberculous cervical adenitis; the proportion of bovine strains in this group was 16 out of 37, or 43%.

From the high incidence of bovine infection in tuberculous cervical adenitis determined by laboratory workers in all countries, it would appear that in the absence of routine determinations of the prevailing types of tubercle bacilli, a reliable index of the progress of a community in the elimination of tuberculosis of bovine origin is to be found in the frequency of occurrence of tuberculous glands of the neck. The commonly expressed opinion of clinicians at the Children's Hospital, Melbourne, whose length of experience renders them competent to judge, is that tuberculous cervical adenitis and abdominal tuberculosis are now much less prevalent than they were twenty years ago, and I have for long felt convinced that tuberculous ulceration of the intestine and *tabes mesenterica* have receded greatly from the prominent places they formerly held in the post-mortem room.

#### Bone and Joint Tuberculosis.

In the present investigation *Mycobacterium tuberculosis* was cultivated from material derived from the tuberculous

TABLE II.  
Comparison of the Present with the Former Investigation.

Sources of Cultures.	Three-year Period.					
	1929 to 1931.			1938 to 1940.		
	Human.	Bovine.	Percentage Bovine.	Human.	Bovine.	Percentage Bovine.
Bones and joints .. .. .	22	0	0	20	0	0
Bronchial glands and lung .. .. .	27	0	0	23	1 <sup>1</sup>	4.3
Cervical glands and tonsils .. .. .	10	21	67.7	13	10	43.5
Mesenteric glands .. .. .	0	4	100	1	1	—
Cerebro-spinal fluid .. .. .	2	0	0	40	0	0
Other sources and duplicates .. .. .	—	—	—	61	—	—

<sup>1</sup> Duplicate.



bones and joints of 65 patients, 20 of whom were children and 45 adults. In every instance the organism recovered was of human type, as was the case in 22 children and five adults in my former investigation. If to these are added four children studied by Penfold<sup>(1)</sup> and found by him to be infected with the human type of *Mycobacterium tuberculosis*, the record to date for osseous tuberculosis may be thus stated (Table III):

TABLE III.  
*Tuberculosis of Bones and Joints.*

Patients.	Human.	Bovine.
Children (aged 14 years and under)...	46	—
Adults .. .. .	50	—

Of the 96 cultures, all of human type, 77 were obtained from patients in Victoria. For the material providing 15 of the cultures from osseous tuberculosis I am indebted to Dr. C. Duncan, of the Commonwealth Health Laboratory, Hobart; two are to be credited to Sydney and one each to Canberra and Launceston.

It is noteworthy that in 46 cultures of *Mycobacterium tuberculosis* from tuberculous bones and joints of children the bovine bacillus is not even represented. That the bovine bacillus plays a large part in osseous tuberculosis in childhood in this country is a notion as tenuous as it is fallacious. The impression has no doubt been gained from text-books emanating from Great Britain, in which country the bovine bacillus has been implicated in arthrosteal tuberculosis to a much greater extent than in this country or the United States of America.

In all probability the bovine bacillus usurped the leading position in tuberculosis of bones and joints in childhood as the result of Fraser's<sup>(2)</sup> early work in Edinburgh (1912). Professor Fraser's startling results showed that of 67 children aged under twelve years suffering from some form of bone and joint tuberculosis, 41 (or 61·2%) were infected with bovine bacilli, 23 with human bacilli, and three with "mixtures of the two types". This high percentage of bovine infections in bone and joint tuberculosis was not confirmed in the results obtained by A. S. Griffith<sup>(3)</sup> (1916) in a series of 18 cases from Edinburgh, which showed a bovine incidence of 27·7%—very little higher than that for children aged under ten years in England and Wales.

In 1928 A. S. Griffith<sup>(3)</sup> published a comprehensive review of 598 cases of bone and joint tuberculosis in Great Britain, in which the type of infecting bacillus had been determined. In this large series the bovine bacillus was implicated in 20·5% of the total, the human bacillus being responsible for the remainder. In children under the age of five years the proportion of bovine infections was 32·8%; in children aged from five to ten years, 24·5%; in subsequent age groups the incidence of bovine infection fell rapidly, and no patient aged over twenty-three years was found to harbour the bovine bacillus.

At a later date (1932) Griffith<sup>(3)</sup> showed that in 520 cultures of *Mycobacterium tuberculosis* obtained from patients affected by tuberculosis of bones or joints in England and Wales and differentiated as to type, the proportion of bovine strains was 18% for the whole series, embracing all ages, and 27·3% in the age group under five years, this group comprising 88 patients. In discussing these figures Griffith commented on the prevalence of the statement that bone and joint tuberculosis in children was generally caused by bovine bacilli. He pointed out that in England the human bacillus was responsible for the greater proportion of the tuberculous infections of bones and joints, causing almost three-fourths in children aged under five years and over four-fifths in persons at all ages.

Thus for England the bovine bacillus is relegated to a 20% to 25% incidence in tuberculosis of bones and joints. The rate is much higher for Scotland, and indeed in all manifestations of tuberculosis the incidence of bovine infection is higher for Scotland than for England. The

combined figures of Fraser, Wang, Munro, Cumming, Blacklock and Griffith<sup>(3)</sup> for bone and joint tuberculosis in Scotland, based on 196 differentiated cultures, show a bovine incidence of 42·8% for all ages and of 60·5% for children aged under five years.

The findings which I have presented allow the bovine bacillus at most a very small part in tuberculosis of bones and joints in Victoria, and while contrasting with the English and Scottish figures they find a parallel in results obtained in the United States of America. Park and Krumweide<sup>(4)</sup> investigated 67 subjects of osseous tuberculosis. Nineteen of the patients were adults and 48 were aged less than sixteen years; in this series of 67 cultures of *Mycobacterium tuberculosis* bovine strains were in a minority of two, one in each age group. At a much later date (1932) R. M. Price<sup>(5)</sup> (Toronto) reported substantially identical results. He studied with respect to type 75 cultures of *Mycobacterium tuberculosis* recovered from bone and joint disease in children aged fifteen years or less, and reported 72 as of human type and three as bovine.

#### *Tuberculous Meningitis.*

Another clinical entity in which the bovine bacillus must be denied for this country the prominence which it has gained in Great Britain is tuberculous meningitis. Griffith's figures for England<sup>(3)</sup> show a 21·8% incidence of bovine infection in meningeal tuberculosis in patients of all ages, and 24·1% in children aged under five years. This "bovine rate" in tuberculous meningitis is based on the findings in 110 differentiated cultures of *Mycobacterium tuberculosis* secured from subjects of meningeal tuberculosis. In 33 instances the culture was obtained directly from the cerebro-spinal fluid and in the remainder (77) from tuberculous glands or organs within the thorax or abdomen. In Scotland a small series of 15 differentiated cultures of meningeal origin, contributed to by Fraser, Mitchell, Wang, Cumming, Blacklock and Griffith<sup>(3)</sup>, showed a "bovine rate" of 13·3% in tuberculous meningitis at all ages, and 16·7% in children aged under four years.

In Melbourne during the period from 1929 to 1931 I examined strains of *Mycobacterium tuberculosis* from 27 children who died from tuberculous meningitis, and found that 25 of them were of human type and two bovine. Only two of these cultures were obtained actually from the cerebro-spinal fluid; but when a child dies from tuberculous meningitis and the human type of bacillus is recovered from the lung tissue, bronchial glands or elsewhere, the possibility that the bovine type is operating in the meningeal phase is remote. The risk of error is minimal in the assumption that the meningeal tuberculosis might be referred to the same type of *Mycobacterium tuberculosis* as was recovered from other tissues in the same patient; this will be made clear in a later section, in which I report an instance of double infection.

In five cultures of *Mycobacterium tuberculosis* obtained from the cerebro-spinal fluid of children and recorded by Penfold,<sup>(1)</sup> one was a bovine strain and the other four were human. Thus in Melbourne, prior to the present investigation, the bovine bacillus was encountered three times in 32 cultures obtained from the same number of children who died from tuberculous meningitis. To the 32 children are now to be added 40 children and eight adults, among whom only one bovine strain occurred. In every instance except one in the more recent series *Mycobacterium tuberculosis* was cultivated directly from the cerebro-spinal fluid; in 19 instances *Mycobacterium tuberculosis* was also recovered from one or more thoracic, abdominal or skeletal foci; but only one instance occurred of discrepancy in types between the strain infecting the meninges and that recovered from another source in the same patient. Again, the patients were predominantly Victorian; specimens of cerebro-spinal fluid from two children and four adults were received from the Commonwealth Health Laboratory, Hobart, and one from an adult patient in Launceston, also through the Commonwealth Health Laboratory.

Among 80 patients, therefore, 72 children and eight adults, the immediate cause of whose death was tuberculous meningitis, the number of bovine infections was four. All



the bovine strains occurred in children, and if the adults are omitted for the purpose of calculating the incidence of bovine infection, it becomes four in 72, or 5.5%.

Included in Table I are three groups of specimens, adequate discussion of which at the present juncture would render this communication of inordinate length; it is hoped in the near future to make the cultivation of *Mycobacterium tuberculosis* from urine (134), gastric content in children (16), and lymphatic glands in relation to tuberculous joints (8), the subjects of separate commentaries. Many of the urinary cultures were provided by subjects of osseous or pulmonary tuberculosis, or both, in whom the presence of symptomless tuberculous bacilluria was thus demonstrated. Observations on the cultivation of *Mycobacterium tuberculosis* from gastric contents in adults have already been elaborated in connexion with bacteriological examinations supplementing the radiological survey of the Australian Imperial Force; but the group of 16 cultivations from this source in children furnished some interesting experiences. The eight cultures of *Mycobacterium tuberculosis* recovered from lymphatic glands in relation to tuberculous joints were adduced in confirmation of histological diagnosis of tuberculosis in the procedure of inguinal gland biopsy as a diagnostic measure in suspected tuberculous disease of the knee joint. Consistently with experience in bone and joint tuberculosis in this country, all of these cultures were of human type.

#### *Lupus Vulgaris.*

A little space may perhaps be taken to comment on three cultures listed in Table I as derived from lymphatic glands in relation to cutaneous tuberculosis; all three cultures were of human type. Two children presented with fluctuant inguinal swellings and the third with an enlarged and softened preauricular gland. The cutaneous lesion on the face of the third child was sufficiently obvious; but in the case of the other two the patches of lupus in the skin of the thigh and foot respectively were not at first apparent and were found by Dr. Russell Howard in a search for infective foci in the lower limb.

Lupus has not been of sufficiently common occurrence at the Children's Hospital, Melbourne, to have enabled me to gather much information regarding the type of *Mycobacterium tuberculosis* mainly responsible for it. In England A. S. Griffith<sup>10</sup> found that the bovine bacillus figured just as prominently in lupus as in tuberculous cervical adenitis; in fact, these two conditions contested pride of place for the highest rate of bovine infection. In 116 instances of tuberculosis of the cervical glands 45.7% were classified as bovine infections, and in 177 cultures of *Mycobacterium tuberculosis* derived from lupus no less than 48.5% were of bovine type. Similar figures hold for Scotland.

At the Children's Hospital, Melbourne, experience concerning lupus has been similar to that of R. M. Price,<sup>11</sup> of Toronto, who, among 220 cultures of *Mycobacterium tuberculosis* recovered from extrapulmonary tuberculous lesions in childhood, obtained only one, and that a bovine strain, from *lupus vulgaris*.

#### Double Infection.

Genuine instances of the concurrent activity of human and bovine types of *Mycobacterium tuberculosis* in the same individual occur very uncommonly, and not all that have been reported as such have been adequately attested.

A. Stanley Griffith, the doyen of the school in all matters pertaining to the types of *Mycobacterium tuberculosis* that have prevailed in Great Britain during the last thirty years, has stated<sup>12</sup> (1937) that in that country mixed infections with human and bovine bacilli have been recorded in only 10 of the 6,000 or more bacteriological examinations made with the object of determining the type of infecting tubercle bacillus. A very interesting feature of these rarely occurring examples of "mixed infection" has been that in all except one of the ten, the two types were associated in the same organ or gland. The single example of the recovery of human and bovine types from different tissues was provided by Blacklock,<sup>13</sup> who made post-mortem investigations in the case of a little boy

who died of tuberculous meningitis. From the left tracheo-bronchial glands a eugonic (human) strain of low virulence to the rabbit was isolated, and at the same time a fully virulent dysgonic (bovine) strain was cultivated from the mesenteric glands. Griffith's review of the authenticated reports of "mixed infection" was introductory to his presentation of an additional instance that he had detected but almost overlooked, owing to the predominance of the bovine type. The patient was a young woman, aged eighteen years, who died of tuberculous meningitis. Griffith adduces convincing bacteriological evidence to show that bovine bacilli were the sole cause of the meningitis, and that bovine and human strains were coexistent in the lung of the patient.

I have now to present an example of "mixed", or as I prefer to describe it, "double" infection, in which, as in the case of the child studied by Blacklock, the human and bovine types of *Mycobacterium tuberculosis* were recovered from different and not closely related bodily structures.

Yvonne T., aged three years, on her admission to the Children's Hospital in May, 1939, exhibited an indolent submaxillary ulcer, which presented a problem in differential diagnosis as between osteomyelitis of the mandible, actinomycosis and ulceration supervening on the breaking down of a tuberculous gland. A search for tubercle bacilli in the surface exudate and an attempt to cultivate *Mycobacterium tuberculosis* from some superficial granulations were both attended by a negative finding. Early in July an enlarged gland situated adjacent to the ulcer was observed to have softened. A fruitless search for acid-fast bacilli in smear preparations of the pus aspirated from this gland was supplemented by cultural examination designed to detect *Mycobacterium tuberculosis*. Tubes of the Petraghani medium, with and without glycerin as a component, and of the plain non-glycerinated Dorset medium, were inoculated on July 11, 1939. Twenty days later (July 31) a microscopic growth of acid-fast bacilli was detected on the media containing no glycerin, but no growth could be discerned by microscopic examination of smears made from the surface of the glycerin-Petraghani medium.

On August 7 growth was visible macroscopically on the non-glycerinated media; one colony had appeared on a glycerin-Petraghani tube, but growth on the plain media was distinctly in advance of that on the medium containing glycerin. A note recorded on August 17 described a flat, "scummy", non-pigmented growth, and expressed the opinion that the strain was probably bovine.

On August 22 a rabbit was inoculated by the technique of intracardiac injection. The animal died on the nineteenth day of the experiment, and displayed on post-mortem examination lungs and kidneys densely studded with miliary tubercles; a lighter sowing was apparent in the spleen and liver. The presumption that this culture from a cervical gland was bovine, based on its dysgonic non-glycerophilic character and lack of pigment production, was fully confirmed by the virulence which it exhibited for the rabbit.

In the clinical notes of the child an entry on August 4, 1939, recorded the presence of multiple glandular swellings in the posterior triangle of the left side of the neck. For the remainder of the year 1939 the little girl attended the out-patient department of the Children's Hospital.

Tonsillectomy was performed in January, 1940; by subsequent microscopic examination of sections I observed characteristic tuberculous histological appearances in one tonsil, but was unable to detect them in the other. Unfortunately the tonsils were transmitted to the pathological department with no indication as to the side to which each belonged; but it may be fairly assumed that the tonsil which displayed tuberculous lesions was on the same side as the affected cervical glands. Observations made at the Children's Hospital, Melbourne, on tuberculosis of the tonsil in relation to tuberculous cervical adenitis were published in a paper which I prepared in 1932.<sup>17</sup>

One month after the operation of tonsillectomy, clinical and radiological evidence of tuberculous disease of the spine occasioned the child's readmission to hospital and subsequent transfer to the orthopaedic section, Frankston. Tuberculous meningitis supervened in July, 1940, and determined the child's death on August 3. An objection on the part of the parents to post-mortem examination was partially overcome by Dr. Stella Altmann, who obtained permission to excise the affected vertebrae. The specimen thus secured, together with a sample of cerebro-spinal fluid withdrawn *ante mortem*, was kindly forwarded to me by Dr. Altmann.

Cultures were prepared from the cerebro-spinal fluid and from the destructive lesion in the body of the first lumbar vertebra. Cultures from both sources were identical in their ultimate development, followed a strictly parallel

course and were of frankly eugonic glycerophilic character. Well-covered tubes of verrucose pigmented growths, flourishing on glycerin media, were obtained from both the cerebro-spinal fluid and the bony lesion; these contrasted in a striking manner with the flat non-pigmented growths obtained from the cervical gland.

The virulence test in the rabbit, for which purpose the culture from the spinal caries was utilized, abundantly confirmed the conclusion already reached that this culture was of *Mycobacterium tuberculosis* of human type. A suspension in saline solution was introduced into the circulation of a rabbit by intracardiac injection on September 12, 1940. The animal was killed on the ninety-ninth day of the experiment; post-mortem examination revealed sparsely sown tubercles in the lungs, kidneys and spleen.

Although the severity and wide distribution of lesions are held by many to be of greater importance than the survival period in the estimation of virulence in the rabbit, the strains under consideration are in contrast in both these respects. That from the cervical gland (bovine) was of nineteen days' virulence in point of time required to kill the animal and induced very heavy dissemination; the culture from the spinal disease permitted survival of the animal for an undetermined period in excess of ninety-nine days and initiated lesions of a comparatively minor degree of severity.

Important points in the child's clinical history were that two aunts had died of pulmonary tuberculosis and that her father had suffered an attack of pleurisy.

Yvonne T., of the Children's Hospital, Melbourne, therefore gains the posthumous distinction of having provided a genuine example of infection with both human and bovine types of *Mycobacterium tuberculosis*—a conjunction which A. Stanley Griffith<sup>(6)</sup> allows to have occurred only 11 times in more than 6,000 examinations in Great Britain, K. A. Jensen<sup>(7)</sup> six times in 3,000 examinations in Denmark, and Bruno Lange<sup>(7)</sup> eight times in 1,027 examinations made in Germany up to the year 1932.

#### Discussion.

In Tables IV and V I have collected the statistics relating to the types of *Mycobacterium tuberculosis* prevailing in Australia, as recovered from children and adults respectively, and classified on the basis of the tissues or bodily fluids from which the cultures were derived. In compiling the tables I have utilized and brought up to date those assembled by Dr. M. J. Holmes<sup>(8)</sup> in 1937; in all, 665 determinations of type have been carried out on cultures of *Mycobacterium tuberculosis* recovered from 601 patients. It is important to note that morbid material from subjects of tuberculosis in Victoria has predominated to such a degree that the figures would be more correctly presented as indicating the position in that State.

TABLE IV.  
Determinations of Type of *Mycobacterium tuberculosis* in Tuberculosis of Childhood.  
(Penfold, 1924; Webster, 1932 and 1941.)

Sources of Cultures.	Total.	Human.	Bovine.	Percentage Bovine.
Bones and joints .. ..	46	46	0	0
Spleen .. ..	9	9	0	0
Bronchial glands and lung tissue .. ..	76	71	5	6.6
Cerebro-spinal fluid .. ..	64	63	1	1.6
Tonils .. ..	7	3	4	57.1
Cervical glands .. ..	50	22	28	56.0
Mesenteric glands .. ..	16	5	11	68.7
Urine .. ..	17	17	0	0
Gastric content .. ..	16	16	0	0
Glands in relation to tuberculous joints .. ..	6	6	0	0
Glands in relation to lupus vulgaris .. ..	3	3	0	0
Sputum .. ..	2	2	0	0
Totals .. ..	312	263	49	15.7

#### Reduced Incidence of Bovine Infection.

The results recorded in the three-year investigation from 1938 to 1940, now completed, indicate a substantial decline

TABLE V.  
Determinations of Type of *Mycobacterium tuberculosis* in Tuberculosis of Adults.<sup>1</sup>  
(Penfold, 1924; Webster, 1932 and 1941; and Officers of the Commonwealth Department of Health.)

Sources of Cultures.	Total.	Human or Bovine.
Sputum .. ..	147	All human.
Urine .. ..	120	All human.
Bones and joints .. ..	150	All human.
Pleural exudates .. ..	15	All human.
Cerebro-spinal fluid .. ..	8	All human.
Glands in relation to tuberculous joints .. ..	2	Both human.
Cervical glands .. ..	1	Human.
Miscellaneous .. ..	10	Human.
Total .. ..	353	

<sup>1</sup> The combined figure for bacteriological examinations directed towards the identification of type of *Mycobacterium tuberculosis* in children and adults in Australia is now to be entered as 665, and represents 601 patients (255 children and 336 adults).

in the activities of the bovine type of *Mycobacterium tuberculosis* in tuberculosis of childhood in Victoria. The rate of bovine infection at the present time has been determined as 8.9%, as compared with my finding of 25.9% nine years ago.<sup>(9)</sup> In the particular manifestation of tuberculosis in childhood in which the bovine bacillus has hitherto been dominant—that is, tuberculous cervical adenitis—it could claim only 43.5% of infections as against 67.7% in the period from 1929 to 1931.

Whether the fall in the rate of milk-borne infection in children could be correlated with a corresponding reduction in the amount of tuberculosis among dairy cattle was a question which naturally arose, and with it speculation as to extended and more effective pasteurization of milk. Information on these points was sought from Mr. H. A. Mullett, Director of Agriculture in the State of Victoria, to whom I am indebted for a carefully compiled memorandum in response to my letter of inquiry.

The data supplied by the Director of Agriculture show that at the present time about 45% of the milk supplied to consumers in Melbourne and its suburbs is pasteurized, as compared with not more than 25% ten years ago. Qualitative improvement also has been registered during the period mentioned, supervision of commercial pasteurization having been rendered much more effective by the introduction of control by the phosphatase test and the installation of improved types of automatic recording thermometers.

Routine tuberculin testing of cattle throughout the State of Victoria has not been carried out on a scale sufficiently extensive to enable conclusions to be drawn regarding a possible decline in tuberculosis of bovines in the State as a whole during the last ten years. With regard to herds supplying milk for distribution in the metropolitan area, however, the records of the Department of Agriculture show a very much improved position. In the year 1930-1931 some 90 herds, comprising 3,000 cattle, were submitted to the tuberculin test, and the percentage of reactors was determined as 7.4. In the ensuing years the number of cows submitted annually to tuberculin testing steadily increased, until in 1939-1940 it exceeded 28,000; in this total, which embraced 727 herds, the percentage of reactors was 2.8.

There is thus an interesting and significant relation between the reduction of tuberculosis in herds contributing to the milk supply of Melbourne and the fall which has been shown to have occurred in the incidence of bovine tuberculous infection in childhood. All the Victorian children examined except one lived in or around Melbourne. Pasteurization of wider scope and more efficient practice has been an important contributing factor. As between the human and bovine types of *Mycobacterium tuberculosis* and their depredations in human disease, the problem presented by the human bacillus is outstandingly the major and more complex, that of the bovine the minor and more manageable. The extent to which bovine tuberculous infection in children

can be controlled and even eliminated is convincingly shown in the experience of Toronto. R. M. Price,<sup>(12)</sup> in a study of the types of *Mycobacterium tuberculosis* isolated from lesions in children, examined 220 patients, ranging in age from five months to twelve years and suffering from some form of tuberculosis. Of these, 190 proved to be infected with the human type and 30 with the bovine type of tubercle bacillus. Without exception the children infected with the bovine bacillus had come from parts of Ontario where pasteurization of milk was not carried out. Inquiry invariably revealed the fact that the child had been fed on raw milk. In the city of Toronto, where pasteurization of milk is compulsory and has been rigidly enforced since 1915, not a single case of bovine infection was encountered in the group of children brought up on the pasteurized milk of the district. In other words, the generation of children reared on pasteurized milk had escaped infection with the bovine type of *Mycobacterium tuberculosis*. "*Dictum sapienti sat est.*"

#### Summary.

A report is presented on the distribution of human and bovine types of *Mycobacterium tuberculosis* as cultivated from 123 children and 183 adults, with some discussion of the criteria to be observed in the differentiation of type and the behaviour of the bovine strain in the Australian wild rabbit.

No instance of bovine infection occurred in 183 adult subjects of tuberculosis in a variety of clinical forms other than pulmonary. Of 123 children aged fourteen years and under, 11 were infected with *Mycobacterium tuberculosis* of bovine type—a bovine incidence of 8.9%. A similar investigation completed in 1932 showed a rate of bovine infection of 25.9%.

The lowered incidence of bovine infection in tuberculosis of childhood, as observed at the Children's Hospital, Melbourne, is correlated with a striking reduction in the number of tuberculin reactors in herds supplying milk for distribution in the Melbourne metropolitan area.

The bovine type of *Mycobacterium tuberculosis* has not been encountered outside the group of tissues comprised by the tonsils and the cervical and mesenteric glands.

Bone and joint tuberculosis in this country is to be traced to human sources of infection; the bovine bacillus has little or no part in osseous tuberculosis, despite a widespread impression to the contrary.

An example of double infection—that is, the concurrent activity of both human and bovine types in the same individual, is reported, with comment regarding the rarity of double infections.

The elimination of the bovine type of *Mycobacterium tuberculosis* as an agent in human disease is, by comparison with the human type, a relatively simple problem. That the activities of the bovine bacillus have been curtailed to the extent shown in the last nine years justifies the statement that there should be no real obstacle to the eradication of this organism.

The observations are presented as applicable to the State of Victoria, since five-sixths of the aggregate of specimens examined were derived from subjects of tuberculosis resident in that State.

#### Acknowledgements.

I have already expressed appreciation of the practical interest in the investigation maintained by Dr. M. J. Holmes, Chairman of the Tuberculosis Committee of the National Health and Medical Research Council, and have indicated my obligation to Mr. H. A. Mullett, Director of Agriculture in the State of Victoria.

Dr. R. A. Willis, pathologist to the Alfred Hospital, Melbourne, and Dr. C. Duncan, of the Commonwealth Health Laboratory, Hobart, have been indefatigable in the collection and transmission of specimens of appropriate material. Sustained cooperation has also been afforded me by Dr. D. B. Rosenthal, medical superintendent of Gresswell Sanatorium, Victoria, and by Dr. H. O. Johnston, medical superintendent of the Austin Hospital, and his successor in that position, Dr. Medwin Hutson. Valuable assistance has also been forthcoming from officers of the

several Commonwealth Health Laboratories mentioned in the text. My technical assistant and *fidus Achates*, Mr. H. Weir, has discharged with tireless enthusiasm an immense volume of work in the maintenance of supplies of culture medium and the examination of approximately 3,000 Ziehl-Neelsen preparations.

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#### REMARKS AND OBSERVATIONS UPON THE ÆTIOLOGY AND DIAGNOSIS OF RENAL CALCULI.<sup>1</sup>

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#### Ætiology.

##### Physical Chemistry of the Urine.

THE problem of the ætiology of renal calculus is intimately bound up with the physical chemistry of the urine, and in this connexion it is interesting to remember that in physical chemistry there are three different sorts of solution—those in which the dissolved crystalloids exist as ions, those in which they exist as molecules, and thirdly, colloidal solutions in which aggregations of crystalloid molecules one layer thick are adsorbed upon particles of colloid. Urine is a colloidal solution and contains in suspension more salts than could be dissolved in an equivalent amount of water.

It would be expected that urinary deposits might form either from an excess of crystalloid or as the result of a disturbance of the urinary colloids, and it will be necessary in the course of this paper to evaluate these two possibilities.

<sup>1</sup> Read at a meeting of the Surgical Section of the South Australian Branch of the British Medical Association on March 19, 1941.



### Classification of Renal Calculi.

In order to define the scope of these remarks some sort of classification of renal calculi is needed, and I know of none better than that which divides stones into primary and secondary types.

1. Primary stones are formed entirely from substances found in the urine and without a preformed nucleus. They consist of crystals stuck together with urinary colloid; examples are mulberry oxalate stones and smooth uric acid calculi.

2. Secondary stones are formed upon a nucleus, which may be a primary stone or some foreign matter, and they require for their formation the addition of a foreign colloid. (a) There is the laminated secondary stone which forms in sterile urine. A rough primary oxalate stone traumatizes the pelvic epithelium and produces hæmorrhage, which is responsible for the mulberry colour. The blood also provides a foreign colloid, which results in the deposition of a layer rich in colloid and poor in salts. The stone is no longer rough, the bleeding ceases and a layer rich in crystalloids is deposited, and the cycle is repeated. (b) Lastly there is the secondary stone which forms in infected urine upon any available nucleus. Here the foreign colloid is provided continuously by the inflammatory exudate, and the typical friable phosphate stone results.

It will be seen, therefore, that we have some sort of understanding (admittedly incomplete) of the mode of formation of secondary stones; but the same cannot be said of the formation of primary stones, and it is therefore upon this part of the subject that interest is centred.

### Two Basic Factors in Stone Formation.

Swift Joly<sup>(1)</sup> has made the following statements:

The presence of crystals, or even of a copious deposit, in freshly voided urine is not necessarily the precursor of stone formation. Many patients pass crystals of uric acid or calcium oxalate for years without ever suffering from stone.

The urine of herbivora is always turbid and throws down a large deposit of phosphates, yet they rarely suffer from stone. I do not think that stone is more common among vegetarians than among those who eat meat, though in the former class turbid urine can be seen coming down the ureters on cystoscopic examination.

Although stone formation is not necessarily a sequel to the passage of crystals in the urine, it is probable that the formation of a calculus is always preceded by the elimination of crystals. If we regard every crystal as being a potential stone nucleus we must enquire why calculi are so rare, as it is obvious that many millions of crystals may be passed in the urine before a stone forms. Other conditions must be present. Probably the most important of these is retention, not the retention of urine, but the retention of the potential nucleus.

There are, then, two basic factors in stone formation—the formation of urinary deposits and the retention of those deposits in the kidney.

**The Formation of Urinary Deposits.**—Two types of urinary deposit occur. There is the deposit which commonly occurs in the first twenty-four hours after the urine is passed. This is due to ageing of the colloidal suspension, and has no bearing upon the problem under discussion. Secondly, there is the deposit which is formed within the urinary passages, and this commonly consists of phosphate, oxalate or uric acid and urates. The deposition is not usually due to excess of these substances in the urine, but to a diminution in the protective action of the colloids, and this is in some way influenced by the reaction of the urine. Phosphates form crystalline deposits in neutral urine, and amorphous and triple phosphates are deposited in alkaline urine. Urates and uric acid are deposited from acid urine, while oxalate deposits, although not greatly influenced by reaction, tend to occur in neutral urine. More will need to be said later of this important question of the relation of the pH of the urine to the formation of deposits.

**The Retention of Urinary Deposits.**—The lowest calyx is the commonest site for renal calculi, and this is probably the result of retention of crystals by the effect of gravity.

Stone in the lowest calyx is fifteen times commoner than stone in the upper (Swift Joly<sup>(1)</sup>). These collections of crystals become cemented together by colloid and a tiny primary stone results. Fortunately, however, the majority of these small concretions are washed away; they provide the majority of those cases of renal colic which are associated with red cells in the urine, and in which the X-ray examination gives negative results. At the Royal Adelaide Hospital in the two years ending December, 1939, "renal colic" was the primary diagnosis in 99 cases among in-patients; in 59 of these the X-ray examination gave negative results. In these 59 cases crystals were reported as present in the urine in only five cases, which suggests that the colic was due to the passage of one small concretion rather than to the passage of myriads of crystals. It will be noticed that nearly twice as many males as females suffer from renal colic. In view of the relationship to temperature shown in Graphs I and II, one may perhaps assume that the increased incidence in the male is the result of increased exposure to the elements.

TABLE I.  
Renal Colic.

Year.	Total Primary Diagnoses of Renal Colic.	Patients with Negative X-ray Findings.			
		Total Number.	Sex of Patient.		Number with Crystals in Urine.
			Male.	Female.	
1938 .. ..	50	26	17	9	2
1939 .. ..	49	33	21	12	3
Total .. ..	99	59	38	21	5

Retention of crystals may be the reason for the added liability to stone formation in congenital abnormalities of the kidney.

### Calcification in Renal Papilla.

Reference must now be made to a recent arresting piece of research by Randall, of Philadelphia,<sup>(2,3)</sup> in which he has advanced a good deal of evidence to show that calcium deposits are common in the renal papillæ, and that if this deposit reaches the surface it will act as a nidus upon which salts begin to crystallize. The salt which is deposited will be the one which most readily crystallizes in the attendant circumstances, be it phosphate, oxalate or uric acid. Of 429 pairs of kidneys with otherwise normal pelvis, in 17% papillary lesions of this type were present. Small calculi were found attached to some of these calcium plaques, and small detached calculi were found still showing the facet of attachment. It would seem that in future a primary calculus may have to be defined as being formed from urinary crystalloids, bound together by normal urinary colloid, and deposited initially upon a calcareous papillary plaque.

In this connexion it is interesting to note that uric acid infarcts are common in infants' kidneys, and that they have been suggested as a possible origin of calculi in children. However, the incidence of stone in children is decreasing, but without any corresponding decrease in the frequency of uric acid infarcts.

### The Factor of Diet.

The influence of diet on stone formations is a complex one. The disease is probably more prevalent among people who live on a poor, monotonous diet. Improvement in the feeding of infants has coincided with a great lessening of the frequency of calculus in childhood; up till the present century this was a not uncommon disease.

**Diet and the Reaction of the Urine.**—The relation of the reaction of the urine to the formation of deposits has already been referred to, and the reaction is dependent to a very considerable extent upon the "ash value" of the diet. A diet of meat, fish and cereals results in a highly acid urine, while a diet of fruit and vegetables will result

in the excretion of an alkaline urine. The ash value of the various foodstuffs has been accurately worked out, and diet tables have been constructed which enable deliberate therapeutic control of the urinary pH to be effected.

**Vitamin A Deficiency.**—There are several interesting pieces of evidence that suggest that vitamin A deficiency may in some cases be a factor in calculus formation. It has been shown experimentally that rats fed on a diet deficient in vitamin A develop calcium phosphate calculi, especially in the bladder, and that calculus formation is preceded by a squamous metaplasia of the transitional epithelium.<sup>(4)</sup>

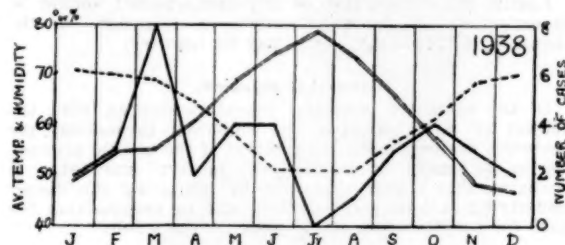
Vesical calculus is a common disease in China, and it has recently been shown that in these cases there is likewise a squamous metaplasia of the bladder epithelium;<sup>(5)</sup> but whether this change actually precedes the calculus formation has not been proved.

Thirdly, vitamin A deficiency produces impairment of night vision, and on this basis Jeans<sup>(6)</sup> has devised a photometric test for the recognition of vitamin A deficiency. In 11 of a series of 16 cases of renal calculus investigated by Higgins<sup>(7)</sup> there was evidence of deficiency.

#### Climate.

A high, dry temperature is said to be a predisposing factor in calculus formation, and in this respect I have collected a few figures which, while interesting and suggestive, must not be regarded as conclusive.

If it is assumed for the moment that renal colic can be caused by the passage of crystals, is there any evidence that renal colic is commoner in the summer when the specific gravity of the urine is probably highest? Of the 99 cases of renal colic referred to above in which the X-ray findings were negative, there did appear to be some sort of relationship with the average temperature and an inverse relationship with the average humidity (Graphs I and II).



GRAPH I.

Showing monthly incidence of renal colic with normal X-ray appearances compared with the average temperature and humidity (1938). The number of cases is shown by the single line, the temperature is indicated in degrees by the interrupted line, the percentage humidity by the double line.

One then wondered whether the incidence of renal calculus might vary from State to State in the Commonwealth of Australia, owing to variations in climate. The figures for deaths from calculi of the urinary passages were obtained for the several States and plotted graphically against the average temperature and average humidity in the capital cities (Graph III). The relationship between deaths and temperature is too striking to be accidental, but there is no apparent relationship with humidity.

#### Geography and Race.

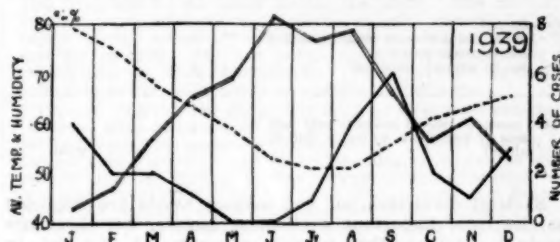
Lithiasis is more usual in the Old World than in the New. The three most important stone areas, India, Mesopotamia and South China, are districts where "civilisation has existed from the dawn of history and where defective hygiene and sanitation are still the rule".

#### Hyperparathyroidism.

In hyperparathyroidism the serum calcium level is raised and the serum phosphorus level is lowered, and there is an increased elimination of calcium in the urine, associated with skeletal decalcification. In 27% of 83 proved cases of hyperparathyroidism renal calculi were present.<sup>(8)</sup>

#### Recumbency.<sup>(9)(10)</sup>

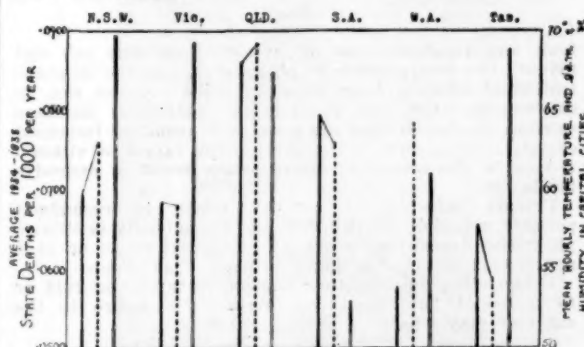
It has long been known that prolonged recumbency is apt to be associated with the formation of phosphatic calculi. A few years ago in London I removed several large stones from an enormous pyonephrotic kidney which was pointing in the loin of a young man who was crippled by infantile paralysis; and from a youth with a severe spinal deformity due to Pott's disease, two large vesical calculi which could be felt bimanually were removed. I have recently performed a nephrectomy for calculous pyonephrosis in a child with Pott's disease of the spine, and ureterolithotomy in a case of infantile paralysis.



GRAPH II.

Showing monthly incidence of renal colic with normal X-ray appearances compared with the average temperature and humidity (1939). The number of cases is shown by the single line, the temperature is indicated in degrees by the interrupted line, the percentage humidity by the double line.

Of 236 cases of infantile paralysis at the Adelaide Children's Hospital, stones in five developed. Two of these patients required operation, one was cured by the acid ash diet or by passing the stones, and two patients still have small stones. Five other patients suffered from haematuria with negative X-ray findings; but in only two of these cases were the symptoms probably due to early stone formation. Two were associated with urinary infection and the fifth with toxic purpura.



GRAPH III.

Showing relation of deaths from calculus of the urinary passages to the average temperature and humidity in each State. The single line indicates the deaths, the interrupted line the temperature in degrees, and the double line the percentage humidity.

Numbers of causes are adduced as factors in the formation of recumbency calculi, and these will be briefly considered. Calcium salts are released from the bones into the blood stream, and are excreted mainly by the urine. The release of calcium salts is the result of general decalcification due to disuse, or of local decalcification at the site of the bone or joint disease due to hyperaemia, and in infective diseases toxæmia may cause a degree of parathyroid hyperplasia, shown by slight elevation of the serum calcium level.

Stasis is undoubtedly of fundamental importance. It will be seen that in a recumbent patient the pelvis of the kidney is at a higher level than the calyces (Figure I), and that the ureter runs uphill over the lumbo-sacral region before dropping down into the pelvis (Figure II).

TABLE II.

Abnormalities due to Recumbency in 236 Cases of Infantile Paralysis at the Adelaide Children's Hospital.

Type of Abnormality.	Number of Patients.	Percentage of Total (236).
<b>Calculi:</b>		
Patients required operation ..	2	2.11
Patients cured without operation ..	1	
Patients had small stones not needing operation ..	2	
<b>Hematuria:</b>		
Probably due to early stone formation ..	2	—
Due to toxic purpura ..	1	
Due to urinary infection ..	2	
<b>Total</b> (cases of proved calculus plus two cases of hematuria probably due to calculi) ..	7	2.96

Skeletal decalcification and urinary stasis are regarded as the most important aetiological factors, but there are probably various other subsidiary causes. A diet rich in

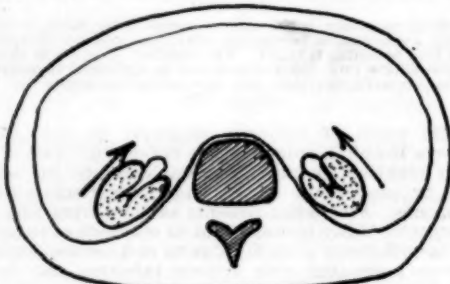


FIGURE I.

fruit and vegetables has an excess of alkaline ash and favours the precipitation of phosphates, and the administration of alkaline drugs does the same. A diet rich in calcium combined with an excess of vitamin D increases calcium absorption from the bowel with resultant increased excretion of calcium in the urine. The excess of vitamin D may be therapeutic in origin or the result of excessive insolation.

Urinary infection is not uncommon in recumbent patients, especially in children, and undoubtedly facilitates phosphate deposition, either as the initial cause or as a superadded factor once stone formation has begun.

Dehydration due to either inadequate intake or fluid or to increased fluid loss from excessive exposure to the sun may play a part.



FIGURE II.

#### Summary of Aetiology.

The following is a summary of the conditions concerned in the aetiology of calculi.

1. The pH of the urine controls the formation of crystalline urinary deposits, which is in turn controlled by the ash value of the diet.
2. For the formation of stone, retention of crystals in the lower calyx (for example) is necessary.
3. A calcareous papillary plaque may be the nidus for primary stone formation.
4. A generally inadequate diet is a predisposing factor in calculus formation.

5. Vitamin A deficiency acts by causing stratified metaplasia of the urinary epithelium.

6. Climatic conditions appear to affect (a) the frequency of renal colic, especially in the male, and (b) the incidence of calculeous disease.

7. Hyperparathyroidism is a predisposing factor in stone formation.

8. Recumbency stones are due to skeletal decalcification plus urinary stasis, and occur in about 2-1% of cases of poliomyelitis.

#### Special Diagnostic Measures.

It will follow from the foregoing detailed consideration of the causes underlying stone formation that these must be taken into account in the diagnostic investigation of these cases. The dietetic history is of importance in all cases, as is the family history in cases of cystine stone. Pyelography has the special significance of revealing the presence and nature of various kinds of urinary stasis.

A history of recurrent stone formation emphasizes the necessity for palpation of the neck for parathyroid tumour, for estimation of the serum calcium and phosphorus levels, and for X-ray examination of the skeleton.

Jean's test reveals the presence of vitamin A deficiency.

Knowledge of the pH of the urine from each kidney is desirable because, when unequal renal function is present, it does not follow that the pH of the bladder urine will be an accurate guide to the pH of the urine in the affected kidney.

The bacteriological condition of the urine is to be investigated by direct smear as well as by culture, because overgrowth of coliform bacilli in culture may preclude the discovery of important cocci.

The microscopic examination of the urine of recumbent patients for red cells will give warning of the formation of recumbency calculi.

Lastly, the composition of any stone passed should be investigated, and more detailed investigation of the chemistry of blood and urine may be required.

#### General Conclusion.

In the extensive historical literature dealing with the subject of renal calculus, the emphasis throughout the centuries has been upon the removal of the morbid product. As in so many other diseases, modern knowledge is changing this simple viewpoint by indicating the deeper underlying pathological condition and by emphasizing the need for consideration of the patient as a whole.<sup>10</sup>

#### Acknowledgements.

I have to thank the members of the surgical staffs of the Royal Adelaide Hospital and the Adelaide Children's Hospital for permission to use their records; and also the South Australian Government Statist and the South Australian Government Meteorologist for their courteous assistance.

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## Reports of Cases.

### A LARGE AORTIC ANEURYSM.

By LIEUTENANT-COLONEL COTTER HARVEY, A.A.M.C.,

AND

CAPTAIN K. B. BURNSIDE, A.A.M.C.,  
Malaya.

The following notes refer to a male Chinese, aged forty years, an inmate of the Malacca General Hospital; he was born in China and has lived in the Malay States for the past ten years. The history was obtained through the medium of two interpreters, the first translating from English to Malay and the second from Malay to Chinese; for that reason the details are not as full as could be desired.

#### Clinical Record.

The patient has been healthy all his life, apart from his present condition and an occasional touch of the "ordinary fever", which has never been severe. (The nature of the "ordinary fever" is unknown.)

About seven years ago he first noticed a small lump on the left side of his back, just above the loin (the position of origin was indicated by the patient); this lump has gradually become enlarged since then, but has never caused him any pain, even when pressed. He remained well and continued his work as a salesman in a provision store until three years ago, when he began to suffer from attacks of

has been able to keep himself by performing intermittent work as a clerk. The pain did not seem to be related to exercise, but he has felt more inclined to do sedentary work than to resume his old occupation as a salesman. He has never suffered from shortness of breath.

About six years ago he had a sore on his penis and a "bubo"; but he denies that he ever had venereal disease before that. His bowels are usually open regularly, but if he does become constipated he is likely to have an attack of pain, so he treats his constipation by eating a banana or a potato, either of which is effective. He has, by his own estimation, lost about half his original body weight during the past year, and has felt generally more ill during that period. He passes urine two or three times during the day and from one to six times during the night. The nocturnal frequency of micturition depends on the amount of fluid taken in the evening, and has been present only for the last six months. He has never suffered from scalding on micturition or from hæmaturia. There are no symptoms referable to the alimentary or respiratory system.

On examination the patient is seen to be a frail emaciated Chinese, with cyanosis of the lips and a large tumour projecting from the lower dorsal aspect of the left side of the thorax (see Figures I and II). This tumour measures seven and a quarter inches in the cranio-caudal direction and five and three-quarter inches from side to side, and projects from the thorax for a distance of three inches. It is pulsatile and expansile, and the heart sounds can be faintly heard over it. The surface is slightly irregular; there are two prominent areas, which give the impression that the contents of the mass are pointing towards the surface. Around these areas there is slight discoloration resembling bruising, and definite though slight pitting œdema of the skin is present round the edge of the mass.

The peripheral arteries are apparently not thickened. The pulse is much weaker in the legs than in the arms; the rate varies from 85 to 90 beats per minute. The blood



FIGURE I.

severe pain in the abdomen and loins. This pain used to occur suddenly when he was in a sitting position, doubled him up and lasted for about half an hour; after this he was exhausted for an hour or so. He was admitted to hospital at that time (the old history has been lost) and given a course of injections, presumably "Novarsenobillon", which relieved him of the attacks of pain. Before the injections he used to have the pain about twice per month; since his discharge from hospital he has been free from it until a few months ago, and he has now returned for more injections because of the recurrence of these attacks.

The patient has been more or less unemployed for the past three years because he did not feel very well; but he



FIGURE II.

pressure in the arms is 90 millimetres of mercury systolic and 70 millimetres diastolic; the pressure cannot be determined in the legs.

The apex beat of the heart is visible and palpable in the fifth left intercostal space, about three and a half inches from the mid-line; there is about one finger's breadth of right cardiac dullness. (The patient cannot lie flat on his back, but is inclined to the right side by the tumour.) A rather harsh systolic murmur is audible at all areas, and there is a short early diastolic murmur, best heard just inside the apex.

Movements of the thorax are poor. The percussion note is impaired over the whole of the lower left quadrant of the

chest and dull over the tumour; it is impaired at the base of the right lung. Breath sounds are harsh at the base of the right lung and absent at the base of the left, both anteriorly and over the tumour. No adventitious are present.

The abdomen is lax and there is no tenderness. No mass or viscus is palpable.

The pupils are equal and circular, and react to light and accommodation. The knee jerks and ankle jerks are equal and active. The plantar reflexes are flexor in type. Power is fair and equal on the two sides. Considerable muscular wasting forms a part of the general emaciation. No gross sensory disturbance appears to be present; but accurate examination is impossible, owing to the difficulty of obtaining the patient's cooperation.

A scar of a bluish colour is present on the under-surface of the penis, just behind the corona. There is also a scar in the left groin, apparently the result of suppurating adenitis. Neither the Wassermann test nor the Kahn test produces a reaction.

X-ray examination reveals considerable erosion of the bodies of the eighth, ninth, tenth, eleventh and twelfth dorsal vertebrae; there is slightly less destruction of the sixth and seventh. This erosion is restricted to the left side of the bodies of the vertebrae. The vertebral ends of the left ninth, tenth and eleventh ribs have been completely absorbed, and the outer part of the ninth rib has been pushed up to lie against the eighth rib. Some areas of calcification are present in the region of the tumour.

#### Comment.

It was thought that this case was worth reporting, as aneurysms of such a size are rarely seen nowadays, at least in Australia. The photographs taken by one of us (K.B.B.) show the size of the tumour and the surprising extent of the bone destruction. The symptoms are entirely those of pressure.

#### Acknowledgements.

Our thanks are due to Dr. C. M. McGregor, Director of Medical Services, Straits Settlements, and to Dr. A. Bearblock, Chief Medical Officer of the Malacca General Hospital, for permission to publish the notes of this case.

### Reviews.

#### INJURIES OF THE JAWS AND FACE.

In the preface to "Injuries of the Jaws and Face"<sup>1</sup> James and Fickling make the statement that "a book produced hurriedly is a misfortune to the writer and to the public". There is, however, no need for this apology, for the book is excellent from beginning to end, and it is moreover exceedingly welcome at the present time.

The opening chapter deals with the organization required to deal with these injuries, and experience gained in the Army Advisory Standing Committee on maxillo-facial injuries enables the writers to discuss matters of importance to the superintendents of general hospitals, the commanding officers of military hospitals and those responsible for the care of air raid casualties.

Other chapters describe the treatment to be given at the various stages of the patient's illness at the first-aid post, the ambulance, casualty clearing station, the special centre or specialized department of the general hospital.

The principles which determine the technique and management of gunshot wounds of the trunk and limbs have to be modified when the wound involves the jaws and face, and a section devoted to the anatomy and physiology of this region deals with these modifications and the reasons therefor.

Throughout the book emphasis is laid on two great lessons—the saving of tissue and the immobilization of the injured parts. "Every fragment of bone although loose if attached to soft tissue should be allowed to remain." "It may

be laid down as a cardinal principle that no tissue should be removed which has a possibility of survival." "The result achieved with firm fixation is remarkable: a patient who was exceedingly ill may be walking about the ward in a few days—a truly dramatic change." "The fixation of the mandible permits painless movement of the tongue and is the most important feature in the operation." "As soon as the mandible was fixed so that pain was reduced they were able to cough freely." We are in complete accord with these views and are of opinion that every facially injured person should be provided with a placard bearing the words "Scrap nothing" and "Fix the jaws". Every aspect of the management of these injuries is dealt with, and although the subject of facial restoration is too large to be discussed, sufficient is given to prepare the way for the plastic surgeon.

The section on fracture of the jaws is exceedingly well done, the methods of fixation by interdental wiring are clearly set out, and diagrams and photographs of models describe the technique in detail.

For far too long the unfortunate sufferer from facial injuries has suffered the further disability of finding himself in no-man's land, of being passed from surgeon to dentist and back again—each fearful of tackling the problem; this position has arisen largely as the result of ignorance on the part of one of the methods and technique of the other.

No longer should this ignorance exist, and when this book has had the reception it deserves, the lot of the pitiable sufferer of facial disfigurement will be a happier one, and we are grateful to the authors for providing us with the opportunity of helping in the good work.

### Notes on Books, Current Journals and New Appliances.

#### A MEMORIAL VOLUME.

THE publication of the "Book of Remembrance of the University of Sydney in the Great War 1914-1918"<sup>1</sup> is an event of which medical graduates should be aware. The book is a record that every graduate who served in that conflict will be proud to possess, and this will apply also to the children of those who served. The volume, which creates at once an impression of quiet dignity, is a record of those who went abroad on active service in the war of 1914-1918 after they had become members of the university or had entered its employment. But it is more than this. The length of time covered by the book has allowed the inclusion of the names of those who went straight from school and were undergraduates only after their active service was over. Also included are those who were returned soldiers and on another university's war roll when they were appointed to the staff of the University of Sydney. As we are told in the preface: "The heart of the book is the Roll of Honour", and this has been restricted to the names of those who gave their lives in the course of the war or died soon afterwards from injury suffered while they were on active service. "The Roll of Service" forms by far the larger part of the volume. In this section every man's name is given and this is followed in each instance by a short military history.

Space has also been found in this volume for reference to certain associated memorials, the home and munitions service and the University Company. The last mentioned group was formed in 1918 and its activities were cut short by the armistice when the first section was about to sail.

This book reflects great credit on Mr. George E. Hall, B.E., and Mr. Arthur Cousins, B.A., honorary archivists of the War Memorial, who compiled it. The task was colossal and we can quite understand that more than seven years were spent "in close and united study" to produce the present result. To Mr. Hall, Mr. Cousins and all who were associated with them in this arduous labour we offer warm congratulations; they have earned the gratitude of those who mourn the dead in the Roll of Honour, of those still living whose names are recorded in these pages, of the university that fostered publication, and of the country that was served so well by those whose names it holds in memory.

<sup>1</sup>"Injuries of the Jaws and Face, with Special Reference to War Casualties", by W. W. James, O.B.E., F.R.C.S., L.D.S., and B. W. Fickling, F.R.C.S., L.D.S.; 1940. London: John Bale and Staples Limited Medium 8vo, pp. 266, with 194 illustrations. Price: 15s. net.

<sup>1</sup>"Book of Remembrance of the University of Sydney in the Great War 1914-1918"; 1941. Sydney: Australasian Medical Publishing Company, Limited. Demy 4to, pp. 599. Price: 23s. net.

# The Medical Journal of Australia

SATURDAY, JULY 19, 1941.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

## DIABETES AND INSULIN RESISTANCE.

IN spite of the enormous amount of work that has been done on the subject of diabetes many gaps still remain in our knowledge of its causation; considerable doubt also exists in regard to the way in which insulin acts. The Croonian Lectures of 1940 by George Graham, published in *The British Medical Journal* in October last year, gave an excellent review of present-day knowledge and made clear many of the gaps. For practical purposes it is sufficient to describe *diabetes mellitus* in the words of such a book as Conybeare's "Textbook of Medicine" as "a condition in which, owing to disease of the islets of Langerhans, there is a derangement of metabolism, particularly as regards carbohydrates, with the result that the percentage of glucose in the blood is increased and sugar is excreted in the urine". It is, however, necessary to remember that though research on the pancreas points to a damage of the  $\beta$  cells, there is, as Graham reminds us, no evidence as to the cause of the destruction. Graham also refers to the work of Shields Warren, who in an investigation of 534 cases found that in only 12 cases was fibrosis of the  $\beta$  cells well marked, in 77 was hyalinization of the island pronounced and in 24 was hydropic degeneration extensive. In 127 cases or 23.7% the pancreas appeared normal. Graham describes these figures as disturbing. In these circumstances, if a defect of the islands of Langerhans is responsible for the manifestation of disease, it is necessary to assume either that a pathological change occurs which cannot be detected by the usual methods of examination, or that interference with the function of the island cells is brought about by some outside agency. Be this as it may, there occurs an increase in the glucose content of the blood and this is combated by the administration of insulin. When the glucose content of the blood has been determined, it is quite impossible, as every clinician knows, to predict how many units of insulin will have to be given before the blood sugar level returns to normal. Considerable variations in the necessary amounts will be found as between different patients, and the amount will possibly vary at different times with the same patient. Sometimes

large amounts are required. The largest amount that has been recorded is that given by H. J. Wiener to a Jewish patient, aged fifty-eight years, who required 3,250 units in twenty-four hours before he came out of coma.<sup>1</sup> His daily requirements ten months later were 440 units. These doses are enormous. J. F. Regan, J. J. Westra and R. M. Wilder, in a communication to which further reference will be made, report a case in which a fifty-three year old patient at more than one stage in his clinical history had to be given 300 units of insulin every day.<sup>2</sup> The condition of insulin resistance that is manifested by these patients is of great interest—it presents a difficult therapeutic problem and inquiry into its causation shows, more clearly perhaps than anything else, how complex a question the aetiology of diabetes really is.

In a discussion on insulin resistance it is convenient to refer first of all to the work of H. P. Himsworth. Writing in *The British Medical Journal* of July 14, 1934, on the subject of "high carbohydrate diets" and insulin efficiency, he expressed the opinion that the benefit of a "high carbohydrate diet" in diabetes was due at least in part to its stimulating effect on insulin production and that the patient in this way was made more susceptible to exogenous insulin. In this article and in a subsequent contribution to *The Lancet* of January 18, 1936, he made reference to insulin resistance. In reference to what he called the unknown "insulin-sensitizing factor" he stated that it was of such a nature that it was intimately concerned with the action of insulin and that its restriction would result in rendering a proportionate amount of the available insulin powerless. Incidentally it may be noted that Himsworth prefers the term insulin insensitivity to insulin resistance; and he goes on to state that the cases in which enormous doses of insulin are required to prevent the patient from developing and dying in diabetic coma cannot be explained on the basis of a lack of insulin. He suggests that they can be explained on the basis of extreme deficiency of the insulin-sensitizing factor. He therefore distinguishes two types of disease "as causing the symptom-complex of diabetes"—one, the insulin-sensitive type, caused by deficiency of insulin, the other the insulin insensitive type, apparently due not to lack of insulin, but to lack of an unknown factor which sensitizes the body to insulin.

It has been stated above that variations will be found to occur in the amount of insulin required to bring the blood sugar level down to normal. This has been shown by O. L. V. de Wesselow and W. J. Griffiths.<sup>3</sup> These observers, who had previously shown that the serum of the fat, elderly, hypersensitive diabetic contained a pituitary-like substance antagonistic to insulin, reported that they were unable to differentiate two classes of diabetics by means of the insulin-glucose test for insulin sensitivity. They concluded that insulin resistance or insulin sensitivity was not characteristic of clinical types of diabetes; these states were also not constant for any one diabetic, for a phase of insulin-resistance could be converted into an insulin-sensitive phase by the giving of a diet rich in carbohydrates together with insulin. They also found that when the diabetes complicated a condition of

<sup>1</sup> *The American Journal of the Medical Sciences*, Volume CXCVI, 1938, page 211.

<sup>2</sup> *The New England Journal of Medicine*, November 7, 1940.

<sup>3</sup> *The Quarterly Journal of Medicine*, January, 1938.



Graves's disease or of Cushing's syndrome, the patients often manifested insulin resistance; this resistance could be overcome by treatment of the primary condition. The conditions that have been reported at various times as being associated with an increased requirement of insulin make a long list. Those quoted by Regan, Westra and Wilder (*loco citato*) include destructive processes in the pancreas, with limitation of insulin-producing tissue, as in cancer, hæmochromatosis, multiple calculi and acute pancreatitis; other endocrine disturbances such as hyperthyroidism and pituitary and adrenal dysfunction; infection; disturbances of function of the liver, as in cirrhosis, chronic passive congestion, hæmochromatosis and syphilis; disturbances of function of the skin and muscles owing to complicating disease, poor development or disuse; cardiac complications with decompensation, œdema and shock or capillary collapse; damage to the brain stem. In regard to many of these conditions the association must surely be rare. In hæmochromatosis the insulin resistance may be very pronounced. Again, insulin resistance with an infection such as tuberculosis must be extremely rare, though E. Wayburn is recorded by Langdon-Brown in "The Medical Annual" of 1937 as having reported a case of complete insulin resistance in a female diabetic of forty-four years of age who had severe and ultimately fatal tuberculosis. Those who wish to go more fully into this question are referred to an article by C. H. Best on the internal secretion of the pancreas that appeared in *The Journal of the American Medical Association* of July 27, 1935. In this article Best expresses the opinion that it is the toxic products elaborated by microorganisms that interfere with the action of insulin.

All work that has been carried out and all the observations that have been made on insulin resistance seem inconclusive until the investigations on the anterior lobe of the pituitary gland are considered. These need not be traced in detail, for they have been well described by Graham in *The British Medical Journal* last October. Reference must, however, be made to the work of Houssay and his collaborators, who showed that the daily injection of suitable anterior pituitary extracts into intact animals might be followed by the temporary appearance of symptoms of diabetes mellitus. F. G. Young showed in 1937 that if a large dose of anterior pituitary extract was given to dogs every day, the diabetic condition might continue after the daily injections ceased and apparently became permanent. (See *THE MEDICAL JOURNAL OF AUSTRALIA*, November 20, 1937, page 926.) With K. C. Richardson, Young described in *The Lancet* of May 14, 1938, the details of the histological changes found in dogs after injection. One of the six animals used by these workers failed to become permanently diabetic, and its islands of Langerhans later appeared to be normal in every respect. Graham has discussed these and other findings and states that it seems certain that the  $\beta$  cells of the islands are damaged by the pituitary extracts and that the diabetes arises as a result of the destruction caused by them. In 1940 H. P. Marks and F. G. Young<sup>1</sup> produced evidence on which they based the assumption that the anterior lobe of the pituitary gland contained a "pancreotropic" or "insulin-increasing" substance which was not identical with either the diabetogenic or the growth-promoting principle, but which they could not assume on

the evidence to be a hormone. Graham in discussing this point states that the destruction of the  $\beta$  cells in any individual case may be due either to a susceptibility of these cells in patients who have a family or racial history of the disease, or to a great excess of the diabetogenic substance. He also refers to another substance described by Young and extracted from the hypophysis; this is a glycotrophic substance. It is, Graham thinks, similar to the substance prepared by Collip, which inhibited the action of insulin. He holds that the evidence for an insulin-resistant type of diabetes is strengthened by the work on the glycotrophic substance. He finds it difficult to attribute the variations in the response to insulin to damage of the  $\beta$  cells which has reduced the yield of insulin. It is also impossible to explain them by the action of the glycotrophic substance unless there is a varying activity on the part of the hypophysis. That this occurs is a pure hypothesis.

Reference may be made also to another hypothesis that has been put forward by Regan, Westra and Wilder in their article that has already been mentioned. They can find no conclusion that will satisfactorily explain insulin resistance. They think that some antagonist to insulin that is not present when treatment is begun must develop in the course of continuous treatment, "because at the beginning the patients do not show this resistance". Their final suggestion is that sensitivity to the antagonist may result from a type of immunity reaction limited to tissue cells, such as those of the reticulo-endothelial system.

From the facts and arguments that have been advanced, only some of which have been set out here (discussion on the liver has been deliberately omitted), it is clear that much progress has been made. Many of the observations are not to be disputed, but they lie around like so many ends of a tangled skein waiting to be woven into one continuous thread. It must be concluded on the evidence that there is a condition of insulin resistance, that the cases of insulin sensitivity and insulin resistance do not all "merge into a larger group showing an approximately normal response". Graham is logical when he concludes that the evidence is in favour of two main causes of diabetes—one in which the  $\beta$  cells are damaged and produce very little insulin, and one in which the  $\beta$  cells are normal, but, owing to the presence of an interfering substance, fail to produce enough insulin, although they may produce a good deal. Putting on one side the rare cases in which interference with the action of insulin results from some infection such as tuberculosis or from some endocrine disorder such as thyrotoxicosis, we must conclude that the pituitary gland is concerned in the phenomenon of true insulin resistance. The idea of the occurrence of some kind of immunity reaction is attractive, although it is purely hypothetical. Regan, Westra and Wilder were led to adopt their hypothesis because of the fact that insulin resistance is so often a matter of gradual development. It is just as reasonable and possibly simpler to postulate, as Graham has done, a varying activity on the part of the hypophysis. It would also be possible, in terms of a necessary factor elaborated by this gland, to explain such interesting observations as those made by Alexander Glen and J. C. Eaton,<sup>2</sup> in which the serum of a patient manifesting insulin resistance was injected into rabbits

<sup>1</sup> *The Lancet*, March 16, 1940.

<sup>2</sup> *The Quarterly Journal of Medicine*, April, 1938.

and induced insulin antagonism in the animals. Since the pituitary gland is the nigger in the woodpile of insulin resistance, it is quite reasonable to ask what part it takes in the causation of the condition known as *diabetes mellitus*. It would appear that the definition of diabetes quoted from Conybeare's book has to be revised. It is in fact generally recognized that diabetes is not a single entity, but probably represents a group of conditions with certain common features and in which insulin treatment is usually effective. The hypophysis, the pancreas and the liver are so mixed in this tangled skein that it will probably be a long time before the threads can be gathered into one.

## Current Comment.

### ALTITUDE TREATMENT.

THE ever-growing use in all countries of the aeroplane both in civil and military operations has naturally led to a greater interest being taken in the physiology and pathology of the human body subjected to high altitudes. There is a possible danger that with this short-circuiting of research the effects of elevations far below those of air travel and mountaineering may be overlooked. When the oxygen supply is inadequate the condition of the body is pathological; but before such a stage is reached there are altitudes which exert a marked but as yet unexplained action on the human being. A distinguished Swiss physiologist has asserted that for each person there is an altitude at which his body carries out its functions best; his own is 5,000 feet above sea level, where minor worries of body and mind vanish and a euphoria not followed by headache is enjoyed. Whether the evolution of man from simian progenitors occurred on plains some thousands of feet above the sea we do not know; but the fact remains that all the great cities and most of the population of the world are to be found at sea level or close to sea level. It has been stated that a hypothetical rise of the sea to the extent of 600 feet would destroy civilization. The increase in the red corpuscle count following a rise from the sea level has been known some time, and this has been supposed to counteract the lowered oxygen supply, but could hardly affect the central nervous system. A definite psychic exhilaration is experienced by most people and is not wholly accounted for by travel and its pleasurable accompaniments, for it has taken place when the elevation has been gained without the cognizance of the person concerned. Altitude treatment is not new, but experience has shown that it is contraindicated in those pulmonary complaints in which increased action of the respiratory muscles and also impendence of oxygen intake may do harm. The latest application of altitude treatment concerns paranasal sinusitis, and is reported by A. H. Andrews, L. W. Roth and A. C. Ivy.<sup>1</sup> The observation was made that sufferers from such sinusitis often experienced relief on taking an aeroplane flight. Starting from this, some research workers in Chicago have subjected patients to lowered barometric pressure for twenty-minute spells and have found undoubted betterment. They think that 8,000 feet should be the upper limit, for above that height oxygen deficiency begins to be harmful. Instead of travel to tablelands or mountains, an experimental sealed room has been built, allowing the air pressure to be reduced from the normal 760 millimetres of mercury to not less than 565 millimetres. The causes of the beneficial action are given by these investigators as increased ventilation of the air passages, accelerated exchange of air between the sinuses and the nasal passages by altered air pressure, also vaso-constriction of the highly vascular nasal mucous membrane; it is well known that nose breathing is easier at high altitudes, and vaso-constriction in the nasal mucosa would allow better drainage and interchange of air.

Criticism may well be levelled at the assumption that reduced pressures in a sealed room can give the effects of altitude. Even if artificial methods were employed to produce variations of pressure, of temperature, of air movements, of light and of sound, there is always the possibility that undetected factors are at work. Zunz and his colleagues in their Monte Rosa expedition came to the conclusion that there was a something in mountain air unexplained by physics and chemistry. The plant physiologist has become aware of the existence of air-borne hormones; might there not be something similar operating on animals? Though Australia possesses no mountains of alpine height, there are facilities for residence at levels between 5,000 and 6,000 feet, precisely those altitudes which have been found to be invigorating, but do not in the slightest degree reduce the higher psychic faculties which are curiously dependent upon partial pressure rather than on the available mass of oxygen. So far, altitude treatment has had few advocates amongst Australian medical authorities.

### PLATELETS IN HÆMOPHILIA.

UNTIL physiology has formulated a theory of blood clotting consistent with all the known facts the pathologist and clinician will be excused if some confusion is observable in their references to this topic. Delayed blood clotting is a condition fraught with danger to the afflicted person, and the duty of medical science is to discover the cause and the appropriate remedy. Hæmophilia is perhaps the best known of the several pathological states exhibiting this peculiarity of the blood; but other causes may be operative, such as are indicated by the useful if inelegant terms prothrombinopenia, fibrinogenopenia, heparinæmia and extreme thrombocytopenia. Many devices have been employed to time the onset of coagulation, but so far the most consistent results have been obtained by observing the coagulation, not of blood, but of recalcified oxalate plasma, where a set procedure is adopted to prevent coagulation by oxalate, to centrifuge the oxalated blood and then to recalcify the separated plasma. There are certainly many puzzling features in true hæmophilia, characterized by its hereditary transmission through the female but manifested only by the male. That the prothrombin content is normal seems to be established. It is interesting in this connexion to note that a low prothrombin level in early infancy has recently been found to be associated with a tendency to free bleeding, but the condition is not hæmophilia.<sup>2</sup> The retraction of the clot, once it has been formed, shows no divergence from the ordinary. The tourniquet test (Rumpel Leede technique) gives a negative result, thus ruling out capillary erythro-permeability.

A discovery of some moment has recently been announced by Armand Quick.<sup>3</sup> If in the preparation of the oxalate plasma from hæmophilic blood the sedimentation has been carried out at a high speed of centrifuging, the onset of clotting is considerably postponed; if a low rate of centrifuging is employed, the clotting comes on sooner. If the oxalated blood is allowed to stand before the centrifuging is carried out, the clotting time is further reduced. Non-hæmophilic blood does not display this difference between quick and slow centrifugation. The key to this behaviour is to be found, according to Quick, in the assumption that in hæmophilia the platelets are abnormally resistant and in consequence their disintegration and the liberation of a clot precursor, thromboplastin, is delayed. Rapid centrifuging drives the platelets into the corpuscular sediment before breaking up has begun; in slow centrifuging a larger number undergoes disintegration and so the clotting process is accelerated. There is a simplicity in Quick's hypothesis which invites sympathetic consideration if not acceptance; but if he is correct, the problem is only pushed further back, for after all what are platelets?

<sup>1</sup> *Quarterly Bulletin of North-Western University Medical School*, Volume XV, 1941, page 46.

<sup>2</sup> Geoffrey Edsall: "The Prothrombin Level in Early Infancy", *The New England Journal of Medicine*, May, 1941.

<sup>3</sup> *The American Journal of the Medical Sciences*, April, 1941.

## Abstracts from Medical Literature.

### DERMATOLOGY.

#### Sulphonated Oil as a Detergent for Diseases of the Skin.

C. GUY LANE AND IRVIN H. BLANK (*Archives of Dermatology and Syphilology*, March, 1941) present a report dealing with the result of the use of sulphonated oil mixture on patients in the dermatological clinic of the Massachusetts General Hospital and in the clinics of nine dermatologists. The sulphonated oil mixture contained 25% sulphonated olive oil and tea seed oils, 25% liquid petrolatum and 50% water, and was used as a substitute for soap. In the author's clinic the specific eruption for which the sulphonated oil preparation has proved most helpful consists of erythematous, papulo-vesicular, sometimes lichenified diffuse lesions occurring on the dorsal surfaces of the hands and fingers, and frequently extending to the lateral surfaces of the wrists, but seldom onto the palms. There is frequently a complete remission during the warm months; relapses follow excessive use of soap. In general, it was thought that almost all diseases of the skin in which soap is contra-indicated respond well to the substitution of sulphonated oil for soap. The ages of most of the patients ranged from the post-adolescent through the middle-age range. Whilst using sulphonated oil, approximately 80% of the patients showed improvement, and in only 8% of cases did the condition become worse. In most of the cases treatment with mild ointment was recommended along with the use of the sulphonated oil. Almost all patients suffering from dermatoses in which soap is contra-indicated, such as atopic dermatitis, contact dermatitis and seborrheic dermatitis, can maintain satisfactory hygiene by the use of sulphonated oil and not be irritated by it. It has been particularly useful for the removal of ointments used in treatment of the scalp.

#### Cat Itch: Cheyletiella and Notoedrus Compared.

J. H. TWISTON DAVIES (*The British Journal of Dermatology and Syphilis*, January, 1941) states that the clinical aspect of cheyletiella and notoedrus in man is much the same. The essential lesion is an urticarial papule, usually small, exceptionally like that of strophulus, which quickly disappears, leaving a tiny prurigo papule. The top may be scratched off and a crust be left, but apart from this there is a striking absence of secondary scratch lesions or infection. The eruption comes out in crops, having relation to contact with the animal, and the distribution may be of the generalized or opportunist variety in either case. In the author's cases of notoedrus itch the eruption did not extend much below the waist, while in generalized cheyletiella parasitovorax cases eruption was everywhere, though it favoured the proximal parts of the extremities, particularly the anterior axillary fold. It seems it never affects the genital organs or appears between the fingers, even when it is profuse on the back of the hands. Both diseases quickly disappear on removal of the offending cat. The

cat harbouring *Cheyletus parasitovorax* is a normal healthy animal merely harbouring a few mites in its coat; the notoedrus-infected cat is a truly miserable object, wasting being severe. The anterior border of the ears primarily, the head and, in advanced cases, the neck are covered with a greyish crust in which the mite is easily found.

#### Treatment of Psoriasis with Photosensitizing Agents: Results with Sulphanilamide.

LOUIS TULIPAN (*Archives of Dermatology and Syphilology*, January, 1941) quotes Goeckerman's successes from the application of an ointment of coal tar followed by exposure to ultra-violet light twenty-four hours later. Therefore since, however, the disease in many cases fails to respond to this treatment, the author tried using an additional sensitizing agent, and for this purpose he selected sulphanilamide. Rimington and Hemmings have reported an increase to nearly ten times the normal maximum of ether-soluble porphyrin in the urine of twelve hospital patients undergoing sulphanilamide treatment. The author used the following technique twenty-four hours before patients were exposed to ultra-violet rays. Twenty grains (1.3 grammes) of sulphanilamide were administered in 0.32 gramme doses every four hours and a mixture of 10% coal tar, 20% acetone and 70% benzene was applied to the cutaneous lesions. A second application was made immediately before irradiation. Then the patient was exposed for two minutes at thirty inches from the lamp. As the skin began to tan, the time of exposure was gradually increased and the distance from the lamp decreased. The author claims that there was an immediate response in every case up to a certain point; he insists that the treatment is not offered as a cure for psoriasis, but is a method for clearing up an attack when other measures have failed. The author feels that with due precautions, such as frequent examinations of the blood, the use of sulphanilamide is not contra-indicated.

#### Action of Dihydrotachysterol in Chronic Pemphigus.

W. J. LEVER AND J. H. TALBOTT (*Archives of Dermatology and Syphilology*, February, 1941) have investigated the use of dihydrotachysterol in the treatment of chronic pemphigus, since this substance contains the calcinosis factor in lighter concentration than viosterol (vitamin D), and secondly, since clinical improvement has followed the ingestion of dihydrotachysterol by patients with *impetigo herpetiformis*, a disease similar in objective manifestations and clinical course to pemphigus. The third reason for the administration of dihydrotachysterol was the anticipated correction of the low calcium concentration in the serum observed in many patients with chronic pemphigus. A reduction in concentration of serum protein and sodium as well as of calcium was observed. An increase in volume of plasma and interstitial fluid was noted in most of the cases which were studied. Ingestion of dihydrotachysterol restored the concentration of the chemical constituents but did not change the altered volumes of body fluids. Clinical and chemical data in regard to ten patients with chronic pemphigus are presented. Decreased concentration of calcium pro-

tein and sodium in the serum was a relatively constant finding. Clinical improvement followed treatment with large amounts of dihydrotachysterol. Seven of the patients became free of lesions within two to four weeks. They remained free as long as maintenance doses were taken. Dihydrotachysterol should be given with circumspection to persons older than sixty, and it is contra-indicated in renal insufficiency.

#### Keratosis Follicularis (Darier's Disease).

S. M. PECK, L. CHARGIN AND H. SOBOTKA (*Archives of Dermatology and Syphilology*, February, 1941) write that some years ago it occurred to one of them that because the chief pathological change in Darier's disease was dyskeratosis the process might be a vitamin A deficiency. Accordingly the patient, a man of twenty-five years of age, was treated with large doses of vitamin A given by mouth. This therapy resulted in a remarkable involution of the cutaneous condition. It was also noted that there was a slow but progressive recurrence when the administration of the vitamin was discontinued. The authors give a preliminary report on four cases of keratosis follicularis. Patients with keratosis follicularis on a normal diet which apparently contains an adequate amount of vitamin A, are unable to maintain a normal vitamin A level in the blood, owing either to inability to absorb the required quantity of vitamin A from the gastro-intestinal tract or to inability to convert the provitamin A (carotene) into vitamin A. This question is now under investigation. In all four cases the patients while on a normal diet containing vitamin A, manifested a decided decrease in the vitamin A content of the blood serum. The carotene content of the blood was within normal limits. A dose of 200,000 United States Pharmacopoeia units of vitamin A was given by mouth daily to three patients and caused a gradual disappearance of the eruption. At the same time there was a gradual restoration of vitamin A content of the blood serum to normal levels.

#### Cutaneous and Conjunctival Manifestations of Sulphathiazole Intoxication.

ITALO F. VOLINI, ROBERT O. LEVITT AND HUGH B. O'NEIL (*The Journal of the American Medical Association*, March 8, 1941) report seven patients suffering from a rash while on sulphathiazole medication—an incidence of 3.9% in a group of 180 patients. The average dose of sulphathiazole employed in the series of 180 patients was 26 grammes. The average dose given to patients in whom rashes developed was 34 grammes. Two patients had cutaneous eruptions after only six grammes were employed. The patients who died were given doses of 50, 51 and 75 grammes respectively. All suffered from severe pneumonic disease, which was the cause of death. The variety of the rashes encountered in this series was as follows: one urticarial, three maculopapular and three definitely nodular; one of the last mentioned was complicated by a purpuric lesion. The chronological sequence apparently is first a macular, then a papular and finally a nodular appearance, depending on the total amount of the drug administered, the continued use of the drug and perhaps the age of the patient. The nodular form, however,



has presented a rash which the authors have not encountered previously in any other disease or condition. The nodules appeared first on the extremities, the extensor surfaces of the hands and arms, and the flexor surfaces of the thighs. The nodules are distinctly elevated above the level of the skin and vary in diameter from one to ten millimetres. The colour is usually dark reddish. The authors conclude that cutaneous eruptions and conjunctivitis are frequently encountered on medication with sulphathiazole. Most rashes develop on the fifth day or later.

#### Skin Peeling and Scarification in the Treatment of Pitted Scars, Pigmentations and Certain Facial Blemishes.

JOSEPH J. ELLER and SHIRLEY WOLFF (*The Journal of the American Medical Association*, March 8, 1941) describe procedures which they have found efficient in obliterating or lessening pitted scars and unsightly pigmentations. The skin-peeling procedure is also used in the treatment of chloasma, marked freckling, excessive oiliness, recalcitrant cases of *acne vulgaris*, rosacea, and to improve the tone of the skin. The term "skin peeling" connotes an artificially produced exfoliation of the corneous layer caused by various chemical or physical measures. The following chemicals are used: salicylic acid, acetone, resorcinol, phenol, beta-naphthol, glacial acetic acid, mercurial salts, sulphur and solid carbon dioxide. Chemical peeling agents can be used in pastes and lotion, and the various formulæ are given. The authors describe the preparation of carbon dioxide slush and its use, and also the method of scarification for improving the appearance of pitted scars.

### UROLOGY.

#### Perinephric Abscess in Children.

H. M. GREENWALD and P. J. KRESKY (*Urologic and Cutaneous Review*, May, 1941) state that perinephric abscess, while seen far more frequently in adults, is by no means rare in children. The tendency is to overlook its possibility, and experience shows that diagnosis is far too long delayed. The vast majority of these abscesses are of hematogenous origin. The original focus may be on the skin or in the upper respiratory tract weeks or even many months before the development of the abscess. It is possible to define the probable source of infection in a little over one-half of the cases. The clinical picture is extremely variable. In a few cases the onset may be sudden, with rigor, high temperature, vomiting and lumbar pain, and the appearance of a loin mass in less than one week. In the majority, however, the onset is insidious, with mere malaise, fluctuating low degree of pyrexia, and no localizing signs at all. At this stage the disease is often mistaken for typhoid fever, influenza, pleurisy, pneumonia, tuberculosis or malaria. If pain does occur at all at this stage, it is of renal type in only 25%. In the rest it is of dull aching or intermittent cramp-like type, and affects one side of the abdomen, therefore being confused with the pain of appendicitis or cholecystitis, according to its location. Dulness and some râles

in the base of the lung on the affected side may be found. Tuberculosis of the spine or hip may be wrongly suspected when the patient cannot extend the thigh. This is because of psoas spasm. Urine examination and culture are inconstant guides, since no abnormality is found in so many cases. Although it has been determined that perinephric abscess results from staphylococcal cortical renal infection in most cases, the cocci do not reach the renal excretory system, except in a few instances. Leucocytosis ranges from 8,000 to 50,000 cells per cubic millimetre, and the polymorphonuclear cells may comprise 90% of the leucocytes in a differential count. Skiagraphic examination is of vital importance in an attempt to make an early diagnosis. The most important signs are blurring or even disappearance of the psoas outline and scoliosis with the concavity towards the affected kidney. Excretion urograms usually show that the renal apparatus is unaffected, but if pictures are taken with the patient in the Trendelenburg, horizontal and vertical positions a lack of mobility on the affected side is noticed, in nearly every case of perinephric suppurative. The treatment is early lumbar incision, with digital exploration around the kidney to find any localized pocket of pus, if the pus does not appear as soon as the perinephric fascia is incised. Aspiration for diagnosis is rigidly condemned, since it will be useless if the pus is not posterior to the kidney, and is dangerous if an attempt is made to place the needle point elsewhere.

#### Body Section Pyelography in Children.

W. N. BOUGNE and H. W. HERKE (*The Journal of Urology*, March, 1941) point out that the greatest difficulty is experienced in the making of diagnostic pyelograms in the case of infants and children on account of intestinal gas. To overcome this they have used body section pyelography (tomography or laminography). By this means all shadows other than those at the desired level can be eliminated. The apparatus used by the authors had a simple linear motion and proved quite satisfactory for their purpose. The skiagrams obtained show a body section through the kidney and parts of the ureter. The structure of the spine is hazy but clearly visible because it is at about the same level. However, shadows of intestinal gas are so blurred that they do not interfere with the demonstration of the pelvic calyces and parts of the ureters. The films are somewhat streaky owing to blurring of shadows in one direction, and the detail and contrast are of different quality from that of routine films. Whereas only about half of the excretion urograms made of children are satisfactory for diagnosis, nearly all can be made readable by the use of laminography.

#### Neurocytoma of Kidney.

H. H. LOUCKS (*The Chinese Medical Journal*, March, 1941) reports, as part of a symposium on tumours of the renal region, the case of a female child of nine years, showing at autopsy a malignant tumour arising in or just beneath the renal capsule on the left side. Her original complaint was obesity (from endocrine disturbance), frontal headache and some disturbance of vision; later she became very ill, with diplopia, vomiting, pyrexia and

the development of various tender swellings (metastases). A mass was then discovered in the left kidney region, and a pyelogram showed upward displacement of the left kidney, with the outline of the calyces still sharp, though they were distorted. The tumour discovered at autopsy was of the type called neurocytoma, similar to that which occurs as a tumour of the suprarenal medulla and also of the retina. It is also known as neuroblastoma or neuroepithelioma. Such tumours are highly malignant and are noted for their widespread osseous metastases, while cranial metastases are especially frequent. Permission to open the cranium was withheld in this case, but no doubt metastases explained certain symptoms. Discussing the peculiar position of the tumour, that is, in association with the renal capsule, the author points out that adrenal rests, of cortical tissue alone or both cortex and medulla, have been observed not infrequently in this situation. This type of tumour is entirely different microscopically from typical hypernephroma. The latter consists of trabeculae and masses of large clear cells, while the neurocytoma consists of a diffuse sarcomatous growth of small darkly staining cells showing many "rosette formations". The adrenal medulla develops in association with the sympathetic nervous system, and sometimes nerve fibrils may be shown up in the centre of the pseudo-rosettes.

#### Suprarenal Cortical Carcinoma.

H. T. KIMM (*The Chinese Medical Journal*, March, 1941) describes the history of a male patient, aged forty-seven years, who suffered for a year or so from pain over the lower extremities and trunk, gradually increasing in extent and severity. Later observation indicated that widespread osseous metastases were present. At autopsy the primary tumour was found in both suprarenal glands, and the final diagnosis was bilateral adrenal cortical carcinoma, with widespread metastases to vertebrae, ribs, scapula and iliac bones, as well as to widely separated groups of lymph glands, the liver, pancreas, brain, bronchus and lungs. Adrenal tumours arise from both medulla and cortex, but cortical carcinoma is the commonest of all. It is extremely malignant and occurs only in adults. Local pain and palpable tumour, both common symptoms, were absent in this case, in which pain from osseous metastases dominated the clinical picture. Fusion of the tumour to the kidney usually occurs, but this rule was not followed in this case. In any case, haematuria is commonly absent in this disease. Microscopically the cells tend to arrange themselves in columns or in irregular groups, and they resemble the cells of the *zona fasciculata* or *zona reticularis* of the adrenal gland. Pleomorphism of the cells is a common feature, and "clear" cells are frequent in occurrence. In 16% of reported cases the condition is bilateral. Hypertension is usually a common symptom, as well as change in sex characters, namely, masculinizing effects in females before the menopause, and abnormal development in males (not applicable to the patient reported). Tumours arising from the medulla of the suprarenal are much rarer, and the one which occurs in adults, the paraganglioma, is very rare indeed. The more common medullary tumour is the neurocytoma, but it occurs chiefly in children.

## Medical Societies.

### MELBOURNE PÆDIATRIC SOCIETY.

A MEETING of the Melbourne Pædiatric Society was held on May 14, 1941, at the Children's Hospital, Melbourne. Dr. H. L. STOKES, the President, in the chair. The meeting took the form of a series of clinical demonstrations. Part of this report appeared in the issue of July 5, 1941.

#### Treatment of Osteomyelitis.

DR. W. KENT HUGHES showed a man, aged thirty-one years, who at the age of eight years had been treated by him at the Children's Hospital for acute osteomyelitis at the upper end of the right tibia. Dr. Kent Hughes said that at the operation he had removed so much bone that it had amounted to the performance of diaphysectomy of the upper portion of the tibia. Regeneration of the bone had produced a result which was practically a restoration of the shaft; the leg had been a sound one and the patient had been able to play football and lead a normal life.

Dr. Kent Hughes explained that in showing the patient he was not advocating the employment of drastic surgery in acute osteomyelitis. He had been encouraged to perform a radical operation in the present instance because of the unqualified success of exenteration for chronic osteomyelitis on seven occasions shortly after he had taken the place of the late Dr. Jeffreys Wood; this success was in contrast with the general failure, usual in those days, to obtain satisfactory results from guttering or boring holes in the bones. Dr. Kent Hughes went on to say that his experience with the disease had practically ceased when he left the staff of the hospital in 1925; but he was aware that there was still considerable divergence of opinion as to the best general method of treatment of osteomyelitis, though the outlook had recently improved somewhat as the result of the introduction of chemotherapy.

Dr. Kent Hughes added that he had had only one failure in the surgical treatment of osteomyelitis, acute or chronic, during seven years. The failure was the case of a lad who had had six separate foci of infection; exenteration of his radius was entirely unsuccessful, and though the upper end of the femur was almost entirely restored, a sinus had formed later and had persisted. In conclusion, Dr. Kent Hughes said that he believed that the Aberdeen surgeon who had introduced diaphysectomy for osteomyelitis still employed it. During the war in Russia and Rumania Dr. Kent Hughes had successfully followed Leriche's treatment of compound comminuted fractures of the femur, and thus had been led to adopt the radical treatment of osteomyelitis. It was important to remember that after diaphysectomy the periosteum should not be allowed to collapse; the space should be filled with gauze soaked in saline solution and wrapped around a Hegar's dilator or similar object. In showing the patient that night he had thought that members would be interested to see the result of a method which he supposed would be condemned by most present-day surgeons.

DR. W. R. FORSTER said that surgical opinion had drifted towards conservative management; some patients were treated merely by encasement of the limb in plaster of Paris; he himself would certainly hesitate to perform diaphysectomy on a very sick child in the acute phase; it would probably be exceptional to obtain satisfactory regeneration of bone. The present view was that diaphysectomy should be undertaken only when there was satisfactory evidence of the presence of a supporting involucrum.

DR. E. E. PRICE said that he was glad that Dr. Kent Hughes had said clearly that he was not advocating diaphysectomy in acute osteomyelitis. The standard treatment which Dr. Price adopted was much more conservative; he made an aperture into the focus in the bone with a large drill, but the opening involved approximately only one-third of the circumference of the shaft.

#### Pathological Conditions of the Hip Joint.

DR. W. R. FORSTER showed a series of three patients illustrating pathological conditions of the hip joint. The first was a girl, aged approximately thirteen years. She had a focus of infection in the neck of the left femur without gross involvement of the joint. Dr. Forster showed this patient because a patient with a somewhat similar lesion had been shown by Dr. H. Douglas Stephens at the meeting of the society held on March 12, 1941 (THE MEDICAL JOURNAL OF AUSTRALIA, May 3, 1941, page 559). Since that meeting the patient shown by Dr. Stephens had come under

Dr. Forster's notice at the Frankston orthopaedic branch, and in her case the actual epiphysis and the joint seemed to be becoming involved. The girl who was being shown had had two heavy falls while playing basketball in February, 1938; these had caused her to limp for a couple of days. Until the following August she had continued to complain of pain in the left hip, which became worse towards evening. The leg was slightly stiff in the mornings, causing her to limp occasionally, and the pain in the hip sometimes kept her awake at night. The occurrence of night sweating had also been noticed. Her appetite had remained good and she had not lost weight. She had come under observation at the Children's Hospital for the first time in August, 1938, and was admitted for investigation and surgical treatment. Slight wasting of the left thigh and limitation of active movement at the hip in all directions were present. The hemoglobin value of the blood was estimated at 87%, and though there was no known contact with tuberculosis, a strongly positive reaction to the Mantoux test was obtained within twenty-four hours, the dilution used being one part in 1,000. In skiagrams prepared at that time the several areas of rarefaction could be seen in the neck of the left femur, but confined to the metaphysis. Dr. Forster showed a series of films taken at intervals during the course of the illness; these were indicative of progress towards recovery. He said that the patient had been confined to bed with the leg in a plaster spica, which had been renewed periodically, but she had been ambulatory for about six weeks at the time of the meeting; a patten on the right foot raised her sufficiently to allow of the swinging of the left leg in its plaster spica when she walked with the aid of crutches.

Another patient shown by Dr. Forster was a boy, aged two and a half years, who had begun to limp two months earlier, one week after the appearance of impetigo and inguinal adenitis of the affected leg. When examined at the hospital on March 27, 1941, he walked with flexion at the right hip and knee joints, and abduction was limited at the hip joint; in skiagrams taken at that time a small area of rarefaction was seen in the right femoral capital epiphysis. On April 3 abduction was more limited, and in further X-ray films the area of rarefaction was seen to involve the juxta-epiphyseal region, presenting a picture extremely suggestive of Perthes's osteochondritis; but it was not thought possible with certainty to exclude a tuberculous aetiology. The child was admitted to hospital on April 10, and at that time he was limping very badly, sparing the right leg; there was no wasting of muscle or evidence of general disturbance of health or of trouble elsewhere than in the neighbourhood of the right hip joint. While the child was in hospital Mantoux tests were very carefully carried out, but no fully positive reaction was obtained. From an X-ray film prepared on April 28 it could be shown that the destructive lesion had increased in the ossific nucleus for the femoral head. Dr. Forster added that the limitation of movement had disappeared, but when he was allowed to stand, the boy still limped.

Dr. Forster also showed a boy, aged seven years, suffering from Perthes's disease. Early in November, 1940, the boy had had a fall causing minor trauma over the right hip, and a month later he began to limp and complained of pain in the right thigh. A doctor was consulted a few days later, as the pain and the limp were persisting, and he had skiagrams prepared, which were produced at the meeting. As no evidence of a lesion was detectable, it was decided that no treatment was necessary; the child's general health was quite good, but the limp and the pain did not disappear. The doctor was consulted again early in April, 1941, and the patient was referred to the Children's Hospital for further investigation. In X-ray films taken there on April 9 the appearances of advanced Perthes's disease were present in the head and neck of the right femur; a further set of skiagrams served to confirm the presence of extensive paraepiphyseal changes and thickening in the neck of the bone. Dr. Forster had anticipated the diagnosis, because at examination thickening was palpable over the right greater trochanter and abduction was limited at the hip joint. Dr. Forster invited those present to feel for themselves the relative thickening over the trochanter, because he and the other surgeons at the hospital had come to regard that sign as an important one in the differentiation of Perthes's disease from tuberculous disease of the hip joint. Mantoux tests with tuberculin in dilutions of one part in 1,000 and one part in 100 had been carried out without the production of any reaction. In addition to the gross limitation of abduction there was slight limitation of all other movements at the hip joint except extension, and the measurement of the circumference in the mid-thigh position was three-quarters of an inch less on the right side than on the left. The boy was undergoing treatment by immobilization on a double Thomas's splint with strapping



extension and six pound weights attached to each limb. In the latest set of films prepared on May 5 it could be seen that bony regeneration was taking place in the femoral neck, but there was still considerable flattening of the bone.

DR. E. E. PRICE thanked Dr. Forster for presenting such an interesting series of patients; he was inclined to consider the first patient as tuberculous, and thought she was on the way to being cured, but he preferred to postpone a positive diagnosis until further improvement was manifested. An unusual feature was the localization of the lesion in the metaphysis. In the case of the second patient shown by Dr. Forster, they faced a radiological diagnostic problem. The joint space was increased without excavation of bone; it was a rapidly spreading lesion with a dense limiting line, which was unusual in a rapidly spreading osteomyelitic lesion. Dr. Price had observed changes similar to those of Perthes's disease in traumatic lesions associated with the reduction of congenital dislocation of the hip; the patient was unusually young for Perthes's disease, but he did not regard that feature as a bar to the diagnosis. The condition of the last patient shown by Dr. Forster was undoubtedly an example of Perthes's disease; the well-developed metaphyseal changes were a recognized variant of the usual picture.

DR. H. BOYD GRAHAM expressed his interest in the patients shown by Dr. Forster. With reference to Perthes's disease, he drew attention to the variability of the course of the activity of the condition and the tendency for cases in which the onset was relatively acute to involve a shorter period of invalidity than others in which the process was slower throughout. The point Dr. Graham wished to make was that it was not wise at an early stage to indicate to the parents precisely the length of time for which the child would have to be subjected to extension or splinting. It was advisable to prevent weight-bearing until quiescence and healing of the lesion were considered to be well advanced, as judged by a study of a series of skiagrams taken, say, every three months. In some cases the whole course was run within one year, but in others it might take over two years. Permanent disability seemed to depend largely on the earnestness with which that treatment was carried out, and it was minimal when *coxa vara* and shortening were least conspicuous.

DR. W. J. MCKILLIP expressed his agreement with Dr. Boyd Graham's remarks about preventing patients with Perthes's disease from using their feet at first and later permitting them to walk in an ambulatory splint, thus preventing weight bearing. Dr. McKillop observed that he thought the youngest patient in the series studied by Dr. J. B. Colquhoun was aged three and a half years.

DR. ELIZABETH MCCOMAS mentioned a patient, aged between two and a half and three years, suffering from Perthes's disease.

DR. B. R. HALLOWS thanked Dr. Forster particularly for drawing attention to the value of the clinical sign of palpable thickening over the greater trochanter on the affected side in the diagnosis of Perthes's disease.

DR. JOHN COLEBATCH said that in the case of the second patient shown by Dr. Forster the Mantoux test, while not producing a full positive reaction, apparently produced a very slight reaction, and as the child had a progressive lesion he thought that the test should be repeated. He had noted that on occasions, when the test was repeated every six weeks or three months, although it failed to produce a reaction at first, it might produce one later. Dr. Colebatch asked whether the surgeons at the hospital had had any similar experiences.

DR. M. O. KENT HUGHES said that he understood that the result of the Mantoux test was not considered "negative" unless injections of a series of dilutions of one part in 1,000, one part in 100 and one part in 10 were made without the production of a reaction. He asked whether there was any real reason why the standard test was not applied completely at the hospital.

DR. COLEBATCH, in reply, said that the chief reason for not proceeding with the test with a dilution of one part in 10 was that that injection was likely to produce false reactions, because the old tuberculin used was a mixture of substances; the injection of one part in 10 had been discarded for the Mantoux test overseas.

DR. C. F. MACDONALD said that, on radiological grounds, he was willing to accept the diagnosis of Perthes's disease for the second and third patients shown by Dr. Forster, and he was particularly interested in the age of the younger patient. In the important series of Harry Platt, of Manchester, the ages of the children at the onset of the disease ranged from three to eight years. In the case of the girl shown first by Dr. Forster a problem of great radiological interest had been raised. Dr. Macdonald was

inclined to favour the diagnosis of coccal aetiology rather than tuberculous; but the question of narrowing of the joint space without inflammation in the joint itself was of great interest and importance. Though he had been unable to find any supporting radiological authority, he believed that narrowing of the space occurred without arthritis, and he attributed it to a disuse atrophy of cartilage, perhaps associated with lytic action. He said that he would be pleased if members of the society would draw his attention to any instances of the phenomenon encountered by them, as he wished to study as much material as possible in order to prove or disprove the truth of the attitude he had already adopted.

DR. ROBERT SOUTHEY asked Dr. Forster whether he had considered the possibility, in the case of the second child shown by him, of relationship between the condition in the bone and the original impetigo and inguinal adenitis.

DR. FORSTER, in reply, said that in the treatment of Perthes's disease the patient might require to be placed in bed to undergo cord and pulley extension, or in a plaster cast, or might be ambulatory on a Thomas's splint, swinging the leg. Dr. Forster had formed the impression that the *coxa vara*, which was apt to cause trouble later, arose from weight bearing. He added that the small patient he had shown that night had been in a four-poster bed undergoing treatment by extension until immediately before the meeting, and would return to that bed forthwith. Dr. Forster did not regard the tender age of the child as a bar to the diagnosis; the age limit was fairly wide. At onset it had varied in his own experience from three and a half to fifteen and a half years. He explained that two separate attempts at the Mantoux test had been made and that at each attempt dilutions of 1 in 1,000 and of 1 in 100 had been used, and on both occasions the result had been rather doubtful.

DR. FORSTER remarked that sometimes patients with acute Perthes's disease showed an increase in the blood sedimentation rate for a while, and that that fact was helpful in diagnosis; if the Mantoux test produced no reaction and if the blood sedimentation rate was low later, tuberculous disease could be excluded. In reply to Dr. Macdonald, he said that he distinctly remembered the case of a patient with tuberculous disease of the spine in which narrowing of the joint space at the hip was seen in the X-ray films, yet nothing went wrong with the hip joint. He believed that the phenomenon occurred quite frequently; he could recall another instance, occurring some months after a patient had sustained a fracture of the femur, and he thought that the same thing happened after lengthy immobilization in the treatment of poliomyelitis. He too regarded the condition as due to atrophy of joint cartilage.

In conclusion, Dr. Forster said that he would only be guessing if he tried to correlate the bone condition with the impetigo in the case of the patient to whom Dr. Southey had referred; often the history of mild injury causing some sort of joint strain preceded the onset of Perthes's disease.

## Correspondence.

### RETINITIS PIGMENTOSA.

SIR: At the Australasian Medical Congress held in Hobart in 1934, I reported seven cases of *retinitis pigmentosa* treated by sympathectomy—six of them in the cervical region of one side. The six cases were operated on by Dr. Trumble. Five of the seven have shown no success whatever, but two of them reacted in a remarkable way, as set out in the proceedings of the congress.

One of them passed out of observation, but I had the opportunity of examining the other (V.C.) on June 25, 1941. She was operated on in April, 1932, that is, nine years ago, at fourteen years of age. In July, 1934, the form vision was 6/12 some letters R., and 6/12 L., but it has varied and was sometimes better. It is now 6/12 R. and 6/18 L., and with both eyes 6/9 partly.

It may be remembered, as recorded in the proceedings of the congress, that the fields before operation were grossly contracted, less than 20° and, as in the second case, expanded enormously some eighteen months after the operation. There was no immediate improvement after operation. They are now much as they were then. The fields are slightly less, but immensely improved from their original condition. She is well, and manages a poultry farm.

It is necessary to keep an open mind, but it may be noted that the operation was performed at fourteen years



of age and that during the nine years which have elapsed no serious deterioration has occurred of form vision and the fields have greatly improved. The fundus appearances have not altered.

As I pointed out in Hobart, three results of operation are possible: (i) no improvement, (ii) *status quo*, or (iii) definite improvement, as in this case.

As no other method of treatment is apparently of any avail, I simply place the facts on record.

Yours, etc.,

JAMES W. BARRITT.

103-105, Collins Street,  
Melbourne, C.I.  
June 30, 1941.

#### X-RAY APPARATUS IN SHOPS.

SIR: A recent claim for compensation resulting from X-ray burns, allegedly received during a screen examination using a portable X-ray apparatus, prompts me to draw your attention to the use of X-ray apparatus as a sales medium in some of the city boot and shoe department stores.

The commercial trade and advertising possibilities of a small screening unit were pointed out to me ten years ago when I was abroad, and at the time I expressed the opinion that it was rather a case of "Children and fools" *et cetera*.

The apparatus is a small, yet sufficiently powerful, shock-proof unit to allow customers to view the bones of their feet within the shoes which they propose to purchase, and no accommodation of the observers' eyes for darkness is necessary. The "X-ray tube-object" distance is very small, and the kilovoltage and milliamperage are those usually employed in the screening of extremities. The time factor appears to be unlimited, as my own observations have shown.

The adult customer is merely curious, and "foot comfort" is the main factor in his choice of shoes.

Yesterday afternoon I watched an enthusiastic mother subject her little son's feet to eight separate screenings while she and the salesman discussed the merits and demerits of each pair of shoes. The total time of these screenings would approximate three minutes and, in my opinion, should be close to, if not actually, an erythema dose for the distance and milliamperage used.

A child of three or four years needs several changes of size in shoes in a year, and it is quite conceivable that such a customer may visit several other stores having the same modern facilities. The salesman attending to me expressed complete ignorance of the technical factors or filter employed in the machine, and I venture to state that most salesmen or saleswomen would be unable to appreciate a compression of the metatarsals and phalanges.

The effect of X rays upon young growing cells is well known, and the result of prolonged or too frequent irradiation and the delayed effects therefrom are also well known to the radiologist, who wisely takes adequate precautions.

The manufacturers and purchasers of such apparatus may—and probably will—contend that there is no danger in their use and that the shoe leather affords some protection to the feet. Opinions vary, but I maintain that there is a real danger in exceptional circumstances, as outlined in this letter.

The erythema, if any, may pass unnoticed by the mother, and the delayed effects upon skin and nails from too frequent and too long exposure during childhood and adolescence may not show for years.

The danger, from a compensation point of view, is therefore remote.

I feel that THE MEDICAL JOURNAL OF AUSTRALIA could use its influence by issuing a warning to the commercial firms and the public against the over-zealous use of such apparatus—particularly in regard to children.

Yours, etc.,

D. G. MAITLAND.

147, Macquarie Street,  
Sydney,  
July 5, 1941.

#### THE RELATIONSHIP BETWEEN DOCTOR AND PATIENT.

SIR: Dr. Brown thinks (see THE MEDICAL JOURNAL OF AUSTRALIA, June 28, 1941) a slogan necessary to put over a reform of medical organization, though he regards slogans as appealing only to the emotions and not to the reason. May I suggest some slogans which appeal both to reason and to the emotions, and to both doctor and patient.

Consider: "All necessary work is of equal value", "Monetize work", "Fair exchange".

What is fair exchange but a practice of the second great commandment? What is monetizing work but recognizing that work for work is the only fair exchange? What is "all necessary work is of equal value" but an economic and finally a financial recognition that it takes all kinds of persons and all kinds of work to make a world, and that the work of all (men, women and children) is essential to the mere physical existence of the nation?

It is the unfair exchange so characteristic of the current financial system which not only clouds the relations between doctors and patients (as Dr. Brown so justly deplores), but poisons all other relationships—within and without the family, between social classes, between town and country, between states and nations, as witness the present state of the world. What an enormous spiritual change would be wrought in a society which abandoned the pursuit of profit for the goal of a fair exchange!

Dr. Brown's analysis of the attitude of patients to doctors is incomplete. Laymen feel at the mercy, in the power, of the professional, whether medical or not (and they are right), and they resent it. No organization will do away with that feeling; indeed it might even increase it (take, for instance, the attitude of laymen to the British Medical Association). Again, they think that we are overpaid—"doctors earn their money easy" is often said and more frequently thought. They will not think this any less if we are entrenched in government posts, secure and in no way dependent on them and their opinions and feelings.

Dr. Brown would sacrifice our freedom to an organization which could not improve our relations with our patients (he mentions how liable our work would be to become impersonal) and which would bring a third party (and that a bureaucrat steeped in a vicious financial system) between us and our patients. Teamwork can be, and is, practised under free conditions as well, perhaps better, than under a central organization. Medicine can be practised as a vocation under bureaucratic conditions, but it is impossible to claim that there can be the personal freedom, the initiative, the absence of a third party interfering between patient and doctor, under a central organization that there commonly is in private practice. We would but get the evils of a bureaucracy added to the evils of private practice!

Were we to adopt the slogans given above, our patients and ourselves would soon be on the same financial footing, the feeling of financial exploitation would disappear, for we would have worked out a mode of social and economic life in which not only doctors and their patients but all workers would practise their vocations and not be seeking a financial profit, but doing their best possible work and being estimated socially by their excellence in it.

Let us not think that organization and sacrifice of freedom to security can do anything but enslave us, and with us (the most traditionally individualist of professions) the common people.

As a nation we are fighting for freedom, though all it has achieved for us so far is martial law and national security acts. At least let us keep our personal and professional freedom and not fall easy victims to those who are out to regiment the world. Let us not sacrifice the freedom of the common people to our security.

Yours, etc.,

MARY C. DE GARIS.

Geelong,  
Victoria,  
July 6, 1941.

#### SUICIDE AND ITS PREVENTION.

SIR: The excellent article by Dr. Derrick and the letter of Dr. A. M. Davidson raise questions whose ramifications are still not fully appreciated by us.

All research on suicide goes to prove that suicide is almost exclusively a disease of high civilizations, and a high incidence in any particular country is an indication that the civilization of that country has reached its peak and if the warning is unheeded the decline of that civilization has begun.

The history of suicide has been extensively reviewed by Dr. Forbes Winslow ("Anatomy of Suicide", London, 1840) and by Dr. Ruth Cavan ("Suicide", Chicago, 1927). Both authors divide the history into three great eras, the Grecian, Roman and Christian. In each of the three eras the sequence of events is standardized. In the beginning religion and patriotism dominated the minds of men and they did not think of themselves. A man's life belonged not to himself, but to the gods and his fatherland. Suicide was rigidly forbidden, and the body of the person suiciding was

subjected to all manner of ignominious treatment. Under such conditions suicide was extremely rare.

When the civilizations of Greece and Rome had reached their peaks men and women became more self-centred and thought only of themselves. Bribery, corruption, debauchery, an insatiable greed for money and power became the ruling passions. Aristophanes in Greece about 400 B.C. and Petronius in Rome about A.D. 50 described customs and thoughts that are hailed today as being ultra-modern. Religion and patriotism declined and with their decline a disregard of human life became apparent. The Stoic philosophers arose and advocated suicide if a man so desired. The essence of their teaching was that a man's life belonged to himself to do what he liked with it. If his life no longer pleased him, well, it was the easiest thing in the world to terminate it. In Rome especially suicide became in time a major problem. Famous leaders of the empire suicided. Their example was followed by so many others that far-seeing Romans feared for the safety of the State. Modern writers who advocate euthanasia, abortion, contraception and such like are advocating principles that utterly wrecked the old Roman Empire.

When the epidemic of suicide was at its height the Roman Empire was shattered almost overnight by the barbaric Goths, and the remnants of its culture were preserved for centuries by monks in monasteries. The Christian era had begun. The Christian Church rigidly forbade suicide, Christian burial was refused the person suiciding, and history repeated itself in that the body of the person suiciding was subjected to all manner of ignominious treatment.

It is agreed that from the time of the recognition of the Christian Church until the Reformation suicide was remarkably rare in all Christian countries.

From the time of the Reformation the history of suicide in any particular country is closely linked with the religion of that country. In countries predominantly Roman Catholic, with the people retaining the religious fervour of the past, the suicide rate is remarkably low. Thus Elre and Spain have the lowest suicide rates in the world. (The statistical statements and conclusions quoted are taken from Dublin and Bunzel's "To Be or Not To Be".) On the other hand, countries which have been most subject to the doctrines of modern philosophers, who have resurrected the old Stoic doctrines, have very high suicide rates. Such is the case with Germany and Switzerland.

The influence of religion on suicide is seen in an analysis of the German figures from 1844 to 1908. The lowest rates occurred amongst orthodox Jews, then Roman Catholics and then Protestants. But when Jews broke away from their orthodoxy their suicide rate became much higher than that of the Protestants. The same thing was seen in the case of Austria before the present war. The population of Austria before the war was predominantly Roman Catholic, with a large Jewish population. But Austria was spiritually and patriotically dead—a fact reflected in their suicide rate, which was the highest in the world. Again, before the present war the suicide rate in France was 50% greater than that of England, and the rottenness of France at that time is only too well known to us today.

High civilizations not only tend to destroy religion, but they create large cities, where restlessness, discontent, loneliness, poverty, misery and riches raise their heads with ever-increasing frequency. And suicide is more frequent in cities than it is in rural areas. But our tendency today is to do away with rural pursuits and to foster industrialization. The influence of such a tendency is reflected in the fact that, given approximately equal conditions, the more industrialized a nation, the greater is its suicide rate. Thus the suicide rate of Italy is double that of Spain, that of Sweden double that of Norway, whilst the suicide rate of the industrial Lowlands of Scotland is more than twice that of the rural Highlands.

The facts are obvious and cannot be ignored. All authorities agree that the low suicide rates among Jews and Roman Catholics is due not only to the fact that both religions forbid suicide, but also to the fact that the religions also take an active interest in the temporal welfare of their members. The Jewish Aid Society is a case in point. The Roman Catholic too in the confessional has an opportunity of telling his sins and having his hopes for the future renewed. Thus we find the devout Jew in the midst of trials and sorrows saying: "The Lord will provide." The devout Irish peasant, overwhelmed by misery and misfortune, says: "God's will be done."

The problem of suicide is thus bound up most intimately with our evaluation of things worldly and of things spiritual and patriotic. The selfish man, dominated by his lust for power, money and pleasure, forgets religion and patriotism, and when the things of the world fail, as they so often do, he has only himself to fall back on and his life becomes unbearable. Suicide thus too often becomes the easiest

solution of his problems, as it was in Ancient Greece and Rome, and in an increasing measure today. But in times of war, when men can forget themselves in a revival of patriotism, the suicide rate falls.

We must consider these facts when trying to find a solution of the suicide problem. Our civilization, in spite of all our humanitarian legislation, has become a survival of the fittest. Who can deny the growth of selfishness, poverty, misery, irreligion and the decreasing amount of patriotism shown during recent years? The problems of that increasing band, rich or poor, who are so ill equipped for the struggle, become overwhelming and they think of suicide. We can give them much help in clinics, as Dr. Derrick suggests, and as has been proved by the Salvation Army when they established such clinics in London. But the psychiatrist or the psychologist in these matters can only act as the assistant of the minister of religion. History proves he cannot replace him.

Thus whilst psychiatric or psychological measures may prevent many suicides, they cannot solve the suicide problem. If we ignore the lessons of history and the present-day lessons of Austria and France, if we put our own interests before those of God and country, the suicide rate, a sure indicator of the degree of our religious and patriotic bankruptcy, will keep on increasing until the inevitable end, and this in spite of all our psychiatric and psychological teachings and theories. May we learn the lesson before it is too late.

Yours, etc.,

The Hospital,  
Kenmore,  
via Goulburn,  
New South Wales.  
Undated.

S. J. MINOQUE.

## Naval, Military and Air Force.

### APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 131, of July 3, 1941.

#### AUSTRALIAN IMPERIAL FORCE.

##### Australian Army Medical Corps.

*To be Lieutenant-Colonels.*—Major (Honorary Lieutenant-Colonel) G. H. Brandis, 1st June, 1941, and Major A. J. Aspinall, 1st May, 1941.

*To be Major and Lieutenant-Colonel (temporarily).*—Captain (Temporary Major) J. B. D. Galbraith, 1st May, 1941.

*To be Captains.*—Captain C. R. Dunkley, 29th April, 1941 (in lieu of the notification respecting this officer which appeared in Executive Minute No. 92/1941 promulgated in *Commonwealth Gazette* No. 105 of 29th May, 1941), and William Cecil Rhodes Sim, 17th December, 1940.

*To be Captains.*—Honorary Captains D. A. Alexander and N. Rose, 1st June, 1941, and Edward Patrick Hennessy, 1st June, 1941, and Geoffrey Glover Cooley, 1st July, 1941.

Lieutenant-Colonel J. R. M. Belth, D.S.O., is brought on the authorized Establishment of Lieutenant-Colonels, 1st June, 1941.

Captain E. E. Broadbent ceases to be seconded in his unit in the Australian Military Forces, 14th June, 1941, and resumes duty in his unit in the Australian Military Forces, 15th June, 1941.

The appointment of Captain W. C. R. Sim is terminated, 2nd January, 1941.

#### ROYAL AUSTRALIAN AIR FORCE.

##### Citizen Air Force: Medical Branch.

The probationary appointment of Temporary Flight Lieutenant (Honorary Squadron Leader) N. M. Cuthbert is confirmed, and he is transferred from the Reserve to the Active List, and is promoted to Temporary Squadron Leader, with effect from 1st May, 1941.

Flight Lieutenant H. C. Finn is transferred from the Reserve to the Active List, and is promoted to Temporary Squadron Leader, with effect from 1st June, 1941.

The following Flight Lieutenants are transferred from the Reserve to the Active List, with effect from 2nd June, 1941: F. T. Humphrey and G. Simpson.

The following are appointed to commissions on probation, with the rank of Flight Lieutenant, with effect from 2nd June, 1941: Adrian George McGlynn, M.B., B.S., Francis William Perrottet, M.B., B.S.

Flying Officer J. S. Burgess is transferred from the Reserve General Duties Branch to the Active List, Medical Branch, with rank of Flight Lieutenant, with effect from 2nd June, 1941.

The probationary appointment of Flying Officer A. Hudson-Butler is terminated with effect from 6th June, 1941.

#### Reserve: Medical Branch.

The following are appointed to commissions on probation, with the rank of Flight Lieutenant, with effect from 5th June, 1941: Donald McKenzie McNab, M.B., B.S., David Hugh Le Messurier, M.B., Ch.B., B.Sc.—(Ex. Min. No. 96—Approved 2nd July, 1941.)

#### NEWS.

The following extracts from a letter by Major F. Westwood Niesche to his wife have been forwarded for publication by Dr. John Storey. Dr. Storey found the letter so interesting that he has persuaded Mrs. Niesche to consent to the publication of these extracts.

It was a very intensive campaign and I was the only one with George Read and three orderlies from the hospital to be up with the frontier forces. We were moving all the time—I might tell you that I had a very harassing time, but I can look back on it now. It was quite an experience, as I did not anticipate going so far forward from a general hospital unit. I had the experience of being the most forward surgeon in the whole of the British forces.

Today I received a bundle of *Sunday Suns* and the Royal Prince Alfred magazine with the P.A. Re-union in it. It was funny to see my own signature in it, and I am glad that they were going to send you a copy of it; it will be nice to keep. It will not be possible to answer all your letters at once in detail, as I have two other batches of yours from Greece, but will go over them gradually and answer any important points as I write letters to you from now on.

First of all I would like to give you a little detail of my trip with my surgical team. You will find it interesting, as I was the only surgeon so far north with the whole of the British forces. I was never less than 70 miles in front of the C.C.S.'s and the most forward one of these was John's C.C.S. It was an experience that I was pleased to have and it was unique, as I was attached to a light field ambulance (British), which was like the old cavalry field ambulance, only with mechanical transport, and we were attached to the armoured brigade, which consisted of crack British units. They were "pukka" soldiers and had been in the French show. Well, we left this country (6th March) on a certain warship, which was notable later in that Mediterranean battle. They treated us splendidly and I spent my birthday on this ship—quite a pleasant day and beautiful weather. We arrived in Athens on the 8th and had a wonderful welcome by the people. We were taken in a bus, the men in trucks, to a place called Karpulisia, nine miles out of the city, to stage next to a British hospital. We were billeted in a beautiful house with hot and cold water laid on. We did nothing there, so could go into Athens at any time. Athens was a marvellous city and we had a splendid time there for a fortnight; I will tell you more about Athens in a later letter. I took many photos of Athens, and although I have lost the films I shall send the prints home to you by someone going home when I get an opportunity. I left Athens (22nd March) with George Read and three orderlies in a funny dirty old train with many other troops going north, but mainly Greeks, particularly their mountain units with mules; lots of these were going through to Albania. We saw many beautiful scenes (the scenery all over Greece is wonderful) and snow-capped mountains. The sanitary arrangements on the train were filthy, and we passed thousands of refugees coming from the northern areas in cattle trucks. We arrived about 10 a.m. at Larissa the following morning and saw many interesting places. We arrived at Katarini (25th March) in the afternoon (2.30) after many delays, and there I contacted the New Zealand A.D.M.S. (You will find a good map of Greece in the Encyclopædia under Greece.) The A.D.M.S. sent us to the N.Z. Ambulance to stay for a few days until the British Ambulance was found as it (British) was very mobile. We stayed there until the 27th. We were camped near the foot of Mount Olympus, which is Greece's highest mountain; it was covered with snow and looked glorious. I shall never forget it and the scenery around. I took a photo of it, but have not had it developed yet. We were treated very well there, and I sent you a letter from that spot. We left Katarini at 8.38 p.m. on 27th for

Plati. A funny thing happened here: our surgical equipment was on a special truck with one of our orderlies and the R.T.O. said it would be hitched onto the train when it came in. The train arrived and we were putting our personal things into the carriage, helped by the other two orderlies, and we found the train suddenly moving and the truck with the orderly was left behind. They had to send it by goods train in the morning, and you can imagine my feelings when I reached Plati without all that surgical equipment (8 cases). We slept at Plati that night in a little farmhouse behind the station and waited for the truck to arrive. Eventually it came and we had to have it hitched onto another train. We left Plati at 10.30 on the 28th and went up to Edessa (Odessa) and round the top of a beautiful lake. The snow scenes were glorious. Here we were about 8-10 miles from the Yugo-Slavian border. We descended onto the other side of the lake to Amyntion. The Greek soldiers on the train were very friendly. At this station we left the train and contacted brigade headquarters, and this was my first contact with the British Army. The Col. made transport available and we set out with our gear to find this light ambulance. It became dark, the lights on the truck failed, and after some hours of travelling we came across a British Field Hygiene Section. The C.O. was very decent and put us up for the night. Early next morning we set out to find the ambulance (29th) and eventually found it outside the village of Mavrodendri. I was made very welcome by the C.O. of the unit and we became attached to them. They were all awfully decent to us. On the 31st the C.O. of a light British ambulance at Odessa sent a staff car down to me to take me to Odessa to see a case in consultation. It was so far (60 miles) that I had to stay the night and came back the following morning. They treated me very well and the scenery was glorious among the mountains. I was very close to the border there and thought that the frontier was impregnable, with all the guns and fortifications. I returned to my ambulance on the 1st April. I wrote some of this local news to you at the time. I spent the next few days setting up our operating theatre. On 7th April John Bellisario turned up during a tour north and had lunch with us. John was stationed 70 miles behind us at Ellison. On the 10th I saw Kozanh bombed; the Germans made a mess of it and blew up the Greek Hqs. there, but they had moved out the previous day. On the 11th we had orders to move and passed through Kozanh. This town was just a shambles in the centre, and a place where we had had dinner several nights before had ceased to exist. We stayed near Servia that night in the pouring rain. At 2 a.m. we had orders to leave and moved with the whole brigade overnight; it was a very interesting movement. This move was due to the Germans coming down on the left flank. After much travelling we passed through Gravina and set up a few miles from the town. I travelled with the C.O. in his staff car. We set the theatre up fully and were told to expect many casualties. On Easter Sunday we had a communion service and soon after that we had casualties arriving. Well, here I did major surgery, and they were major jobs too (the wounds were awful). I worked for nearly 30 hrs. without ceasing. My batman brought in tea and something to eat in between cases. Read gave the anaesthetics and the C.O. made one of his medical officers (a Mr. H. (2 pips)) available as my assistant. The work was particularly heavy and we were harassed by bombing and machine gunning most of the day. It was very cold through the night and I wore a leather jacket (issued to me there and I still have it) under my operating gown. Next day (still working) we were dive-bombed and machine-gunned nearly all day. The climax came late in the afternoon, when the Germans must have decided to put an end to our outfit altogether. The casualties were coming in so rapidly that it was impossible to cope with them, and Brigade sent through to say that the road to the C.C.S. had been blown up and that we had to take all casualties. Many died before reaching us in the ambulances and others died soon after. H. decided to do a few smaller cases in the next tent to try and cope with work. Just then bombing started in earnest (dive-bombing) and machine gunning; they were absolutely devils. One big bomb decided the issue, and H. in trying to run to a slit trench was wounded in the chest—a terrific wound—and the corner of my tent was blown open and debris landed on the transfusion pannier, and the tent was just a shambles. A clod of earth about 2ft. across also came through the top of the tent. I had just finished a plaster. I had a tent strapped onto the side of the operating tent for transfusions and cases waiting for operation, and these people suddenly found themselves in the open; the tent had mostly vanished. One poor chap was waiting for operation in this tent and received two extra gunshot wounds in the chest. Poor H. was in a bad way with a large abdomino-thoracic wound, and I intended



to do him later after he had had a transfusion and had picked up. The ground outside looked as if it had been ploughed up, and there was one unexploded bomb in the centre of the ground. Just after this Brigade sent through to say that the Germans had broken through on the left flank, that we had to pack and move immediately, otherwise we would be cut off and captured. I have never seen men take down tents and pack so quickly, and I can tell you that I packed a little quicker than usual. The C.O. ordered that H. had to be transported in one of the ambulances, and I travelled through the night with him and three other cases that I had done the previous day and were thought fit to travel. As was expected, poor old H. gradually became worse, partly due to the rough roads, and he died during the night. He was conscious until near the end. I had a depressing night and had had no sleep for several nights. I was awfully sorry about Lieut. H.; he was one of the nicest chaps I have met and the most popular man in the unit. He had a wife and two children in England. The other cases that I did stayed behind with one section of the ambulance, and fortunately later were evacuated to the C.C.S. safely.

We moved about fifteen miles into woods and slept under trees. About 2 p.m. we moved on. Near Trikila (am not sure of spelling) we were machine gunned and bombed, but we had no casualties. Everyone was moving south, and during the bombing and congestion, etc., the unit became split and it was divided into several portions. We had not the faintest idea where the C.O. was; the road had been bombed and a truck was overturned and they were temporarily cut off. My truck and another truck kept together, and after travelling about 70 miles in the dark we arrived at Larissa at 3 a.m. the next morning. At dusk during that journey we were bombed again. Many times there were air-raid warnings and we had to stop the trucks and fly off as far from the road as possible; we always wore our tin hats and lie flat on the ground, in a ditch, or use any cover possible; we were always filthy dirty with dust or mud. We were still retreating from the Germans. We had absolutely no aerial support at all. I only saw one British plane in a whole month. I will stop the story here and continue it in my next letter. I am giving you this detail as a record; do not be upset about it; it is all over now or I would not have written about it all. I have told you the worst part of it, but I will complete it as far as Athens next time. We had many amusing incidents as well. I am pleased that I had the experience in the forward area. I never expected to, from a general hospital. I was the only one from our own unit with Read to function properly at all. John Bellsario and his crowd arrived early this morning. This afternoon John and I went over to see Don McCredie and had a couple of spots for a change. On arrival here I was so tired of this old battle dress that I went into the local town and bought a shirt and shorts and two singlets, a pair of underpants and a few small things. It was wonderful to be in different clothes. Cop is going back home in two days, so you must see him when he arrives and find out all the news.

#### MEDICAL WAR RELIEF FUND.

DR. R. H. FETHERSTON, who is a Vice-President of the British Medical Association, has received a letter from Dr. G. C. Anderson, the Secretary of the Parent Body, in which he refers to the Australian Medical War Relief Fund. Dr. Anderson writes:

It is most heartening to read of your enthusiastic support of our Medical War Relief Fund. This is indeed generous and will help the many cases of hardship which are already occurring, either through evacuation, bombing or other causes due to enemy action. You will I know be glad to hear that the fund is to be utilised here and now to smooth the path of those in difficulty; there is no suggestion of building up an enormous fund which is to be inviolate until after the war or until a lot of unnecessary red tape has been cut away. It is cash the men want to meet immediate difficulties, and it is only by responding immediately to such appeals that the fund will flourish. One thing we have made sure of, and that is that the Distribution Committee is composed of people used to dealing with claims of this nature and who are therefore in a position readily to assess the requirements in each case. I shall never be sufficiently thankful that we started such a fund early on.

The Libyan campaign was a great tonic. It was a masterly stroke, carried out brilliantly and with the usual British thoroughness. It is true we may be slow to start, but once the preparations are complete, from the word "Go" the men

will get on with the job. What is so heartening is that, compared with the magnitude of the campaign, the casualties have been so few and the spirit of the men still undaunted. It has given us all fresh heart to carry on in the midst of many difficulties. As a matter of fact, in spite of all our trials and tribulations, the spirit of the people remains, as far as one can see, absolutely steadfast. If this can be said when the winter is drawing to a close it augurs well for the coming months, with the spring and summer to look forward to, no matter what they may bring by way of surprises from the enemy.

The following is an eleventh list of contributions to the Medical War Relief Fund established by the Federal Council of the British Medical Association in Australia for the relief of distressed medical practitioners in Great Britain.

#### New South Wales.

- f21: Sir Robert Wade.  
f10: Dr. W. O. Pye, Dr. R. G. Woods.  
f5 5s.: Dr. J. W. Mason, Dr. C. Read.  
f5: Dr. R. E. Wherrett.  
f3 3s.: Dr. W. S. Dawson, Dr. J. C. Lamrock, Dr. H. G. Howell.  
f2 12s. 6d.: Mr. A. Flanders.  
f2 2s.: Dr. M. O. Stormon, Dr. M. Glommi, Dr. Edith M. Hurman, Dr. J. G. Hunter.  
f1 1s.: Mr. J. Bult, Dr. Irene Bray, Dr. K. G. Lawrance.

#### Queensland.

- f21: Dr. C. E. S. Jackson (first donation).  
f20: Dr. G. Oakeley.  
f10 10s.: Anonymous, Dr. C. E. S. Jackson (second donation).  
f10: Dr. Alex. Murphy, Dr. G. P. Dixon.  
f5 5s.: Dr. D. G. Croll, Dr. R. S. Cohen, Dr. V. N. B. Willis, Dr. R. A. Baker, Dr. A. J. Turner, Dr. E. W. Kerr Scott, Dr. L. B. Elwell, Dr. B. L. Hart, Dr. K. K. Shaw.  
f3 3s.: Dr. C. Dinwoodie, Dr. A. E. Mason, Dr. T. M. Mansfield, Dr. C. R. R. Huxtable.  
f2 2s.: Dr. H. N. Merrington, Dr. R. Grant, Dr. H. L. Hawthorne, Dr. A. J. Barnett, Dr. A. T. Pitt, Dr. Joyce Stobo, Dr. A. C. Roper, Anonymous, Dr. L. P. Winterbotham, Dr. T. I. Wallace, Dr. J. L. Simmonds.  
f2: Dr. M. Patterson.  
f1 1s.: Dr. R. L. Rankin, Dr. J. A. Goldsmid, Dr. J. G. Wagner, Dr. D. C. Flson, Dr. J. A. Arratta, Dr. J. H. Blackburn, Dr. C. H. Lloyd, Dr. H. S. Patterson, Dr. S. V. O'Regan.

#### Western Australia.

- f10: Dr. G. A. Thompson.  
f5 5s.: Dr. S. Cohny, Dr. T. W. Meagher, Dr. L. W. Martin and Dr. B. O. Bladen (last three, joint contribution).  
f2 2s.: Dr. E. W. Arndt, Dr. L. Cook, Dr. E. C. Pope, Dr. W. P. White, Dr. E. J. T. Thompson.  
f1 1s.: Dr. K. Aberdeen, Dr. F. W. Simpson, Dr. H. G. D. Bredahl and Dr. D. R. Wilson (last two, joint weekly contribution), Dr. G. W. Barber, Dr. H. G. D. Bredahl and Dr. D. R. Wilson (last two, joint weekly contribution).

#### Obituary.

##### REGINALD HERBERT MORRISON.

We are indebted to a colleague who wishes to remain anonymous for the following account of the career of the late Dr. Reginald Herbert Morrison.

With the death of Dr. R. H. Morrison a very familiar figure to many generations of Melbourne medical men will be seen no more.

"Reggie", as he was known more or less universally, was for many years one of the leading gynaecologists of Melbourne, but for the last seven or eight years he had retired from active practice.

He was a member of a notable family. His father, Dr. George Morrison, founded Geelong College in 1861 as a private school, and Norman, one of his brothers, was afterwards headmaster of that school, which developed so splendidly that in 1908 it became one of the Associated Public Schools of Victoria. The famous Dr. Alexander Morrison, of Scotch College, Melbourne, was a brother of Dr. George Morrison. That generation of the family contained six graduates of Aberdeen University who were

honoured by the bestowal of the coveted LL.D. degree. George Ernest Morrison, known the world over as "Chinese" or "Pekin" Morrison, was one of Reggie's brothers; he was advisor to the Chinese Government in the Boxer Riot days, and through spending many years in China was the outstanding English authority on the country. All the other brothers and sisters were well-known citizens of Victoria, and his mother lived to the great age of ninety-four years.

The late Reginald Herbert Morrison was educated at Geelong College and Edinburgh University. While at school in Geelong he became prominent in the field of athletics—a field in which he became outstanding in Scotland. He captained the school cricket and football teams in 1880 and 1881, and also played senior football for Geelong for two seasons in which that team was the leading team in the association. In Scotland he became the best quarter-mile runner in the land, excelled in swimming and cricket, and played international rugby for Scotland during three seasons. He thus earned the reputation of being the finest all-round athlete any private or public school ever sent from Australia to Great Britain.

On returning to Australia about 1890, Morrison built up a large and successful general practice at Toorak, Melbourne, and his interest in obstetrics and gynaecology soon became evident. He joined the honorary medical staff at the Women's Hospital and over a long span of years served that institution at first on the obstetrical side and later as a gynaecological surgeon. In 1910 he relinquished the general practice at Toorak and confined his attention to his special subject in Collins Street. After he had become the senior surgeon at the Women's Hospital he succeeded the late Dr. Felix Meyer as the university lecturer in obstetrics and gynaecology to senior medical students, and he retained that lectureship for two years after he had retired from the staff at the hospital. He was a good teacher and took great pains to see that the students learnt as much as he could teach them. Though he was rather severe at times, it was generally recognized that he had a kind and sympathetic heart, and he was held in high esteem by his colleagues and was dearly beloved by his patients.

For many years Morrison was an active member of the Melbourne Club, serving several terms as a member of the committee, and on one occasion he had the distinction of being president; and he was also a member of the Rotary Club for a number of years. He was associated with the formation of the Royal Australasian College of Surgeons, of which he was a foundation Fellow, and he was on the Victorian State Council of the College for several years.

This versatile man was considered to be one of the best exponents of bridge in Melbourne, and he dearly loved the game. He has left a widow and three sons to mourn him. All the sons are regular soldiers, and Dr. and Mrs. Morrison took an intense pride in the progress of their military careers; at the present moment they are all actively engaged in the world struggle.

#### BENJAMIN ROBERT ARCHER TAYLOR.

We regret to announce the death of Dr. Benjamin Robert Archer Taylor, which occurred on June 28, 1941, at Meckering, Western Australia.

### Australian Medical Board Proceedings.

#### SOUTH AUSTRALIA.

THE undermentioned have been registered, pursuant to the provisions of the *Medical Practitioners Act, 1919 to 1935*, of South Australia, as duly qualified medical practitioners:

McLeay, Leslie Margaret, M.B., Ch.B., 1935 (Univ. Manchester), Walkerville.

Berry, Annie Hayes, M.B., Ch.B., 1937 (Univ. New Zealand), Children's Hospital, Adelaide.

Gumley, Albert John, M.B., B.S., 1934 (Univ. Melbourne), Munitions, Cheltenham.

Gratton, Marshall Gladstone, M.B., B.S., 1941 (Univ. Adelaide), Royal Adelaide Hospital, Adelaide.

Horman, William Dinwoodie Ackland, M.B., B.S., 1941 (Univ. Adelaide), Royal Adelaide Hospital, Adelaide.

Krantz, Kenneth David, M.B., B.S., 1941 (Univ. Adelaide), 8, Alexander Avenue, Rose Park.

Slater, Alys Lennox Graham, M.B., B.S., 1926 (Univ. Durham), Children's Hospital, Adelaide.

The following additional qualification has been registered: Swan, Charles Spencer, Adelaide (M.B., B.S., 1935, Univ. Adelaide), M.D., 1941 (Univ. Adelaide).

### Nominations and Elections.

THE undermentioned have been elected members of the New South Wales Branch of the British Medical Association:

Matheson, Mervyn William, M.B., B.S., 1938 (Univ. Sydney), 406, Chapel Road, Bankstown.

Schlink, Franziska, M.B., B.S., 1932 (Univ. Melbourne), Broken Hill and District Hospital, Broken Hill.

Crawley, Arthur Herbert, M.B., B.S., 1916 (Univ. Melbourne), 142, Addison Road, Manly.

Basser, Adrian Gustave Nelson, M.B., B.S., 1939 (Univ. Sydney), Saint Joseph's Hospital, Auburn.

Latimer, Thelma Lottie, M.B., B.S., 1939 (Univ. Sydney), 375, Pacific Highway, Lindfield.

### Diary for the Month.

JULY 22.—New South Wales Branch, B.M.A.: Medical Politics Committee.

JULY 23.—Victorian Branch, B.M.A.: Council.

JULY 24.—New South Wales Branch, B.M.A.: Clinical Meeting.

JULY 25.—Queensland Branch, B.M.A.: Council.

JULY 25.—Tasmanian Branch, B.M.A.: Council.

JULY 31.—New South Wales Branch, B.M.A.: Branch.

JULY 31.—South Australian Branch, B.M.A.: Branch.

AUG. 1.—Queensland Branch, B.M.A.: Branch (Ordinary).

### Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

**New South Wales Branch** (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phoenix Mutual Provident Society.

**Victorian Branch** (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

**Queensland Branch** (Honorary Secretary, R.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

**South Australian Branch** (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

**Western Australian Branch** (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia.

### Editorial Notices.

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